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NATIONAL MUSEUM MELBOURNE

The Journal of the Department of Agriculture of Victoria, Australia.

February, 1924.

PRINCIPAL CONTENTS

Wheat and Its Cultivation

Crop and Fallow Competitions

Oidium of the Vine

A Sheep Dip Platform

Chicken Pox

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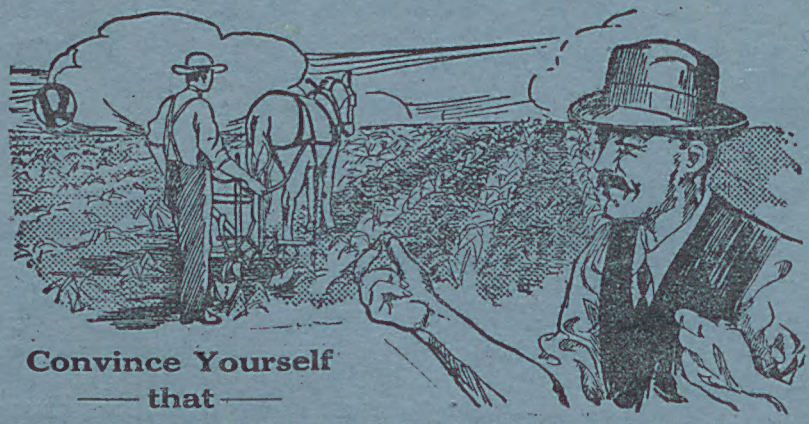

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OF

THE DEPARTMENT OF AGRICULTURE,

VICTORIA, AUSTRALIA.

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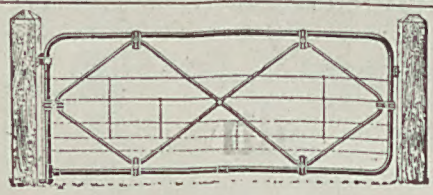

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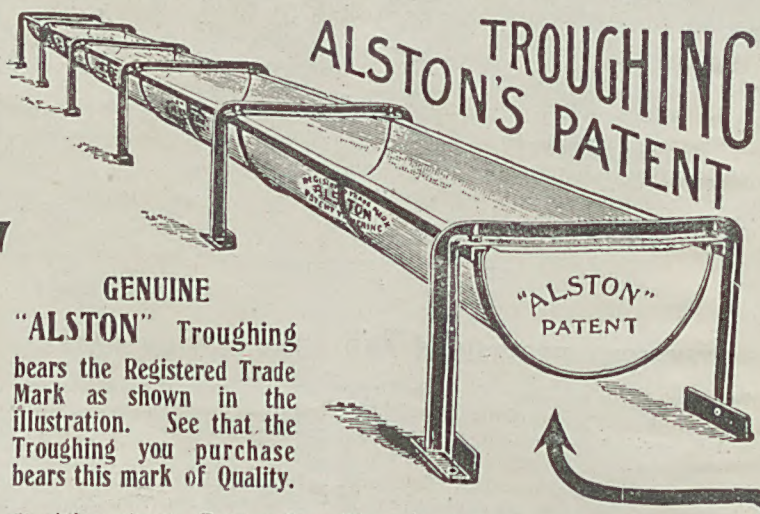

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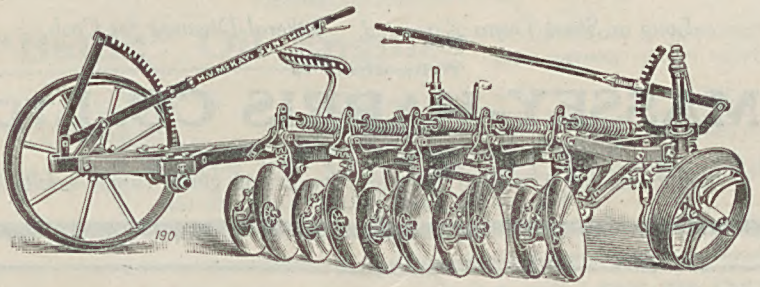

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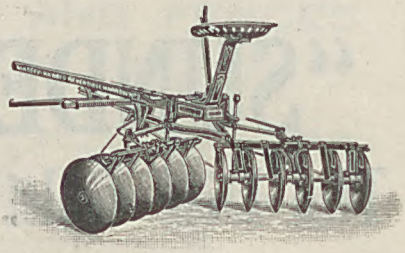

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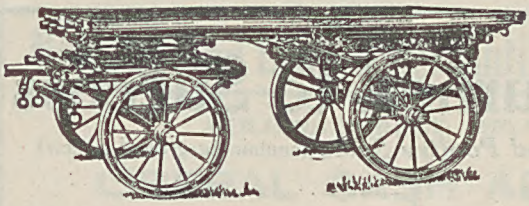

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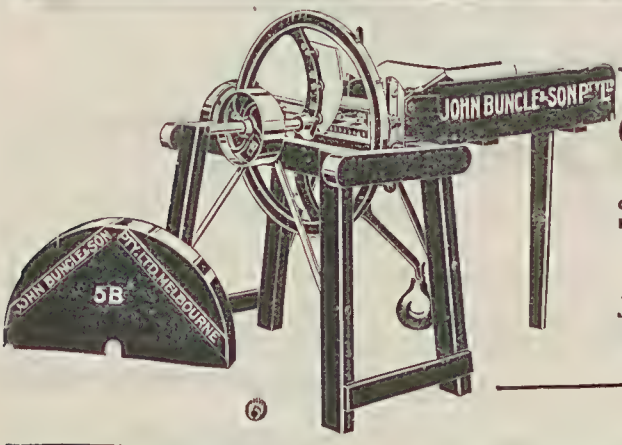

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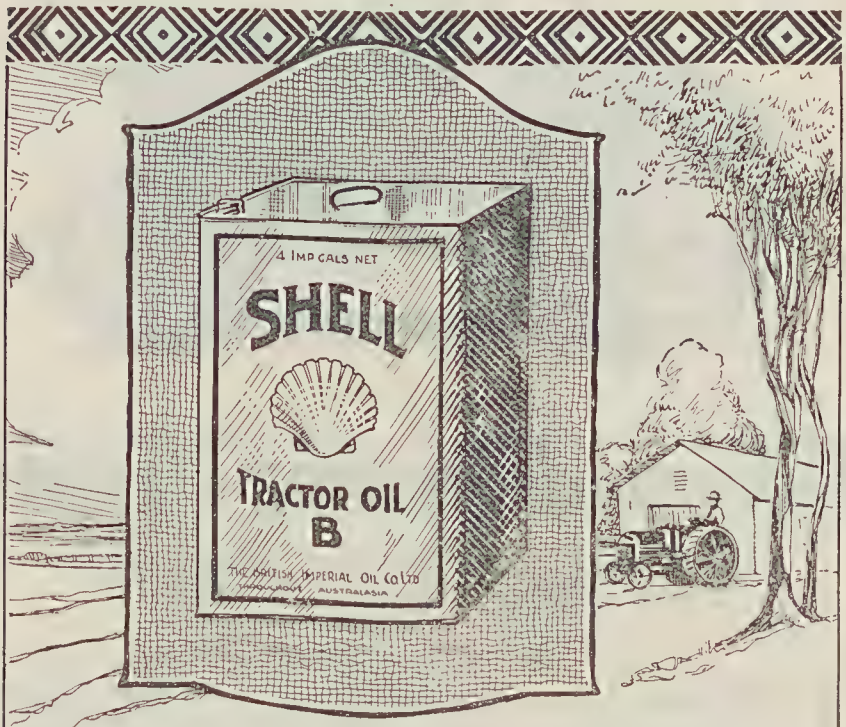

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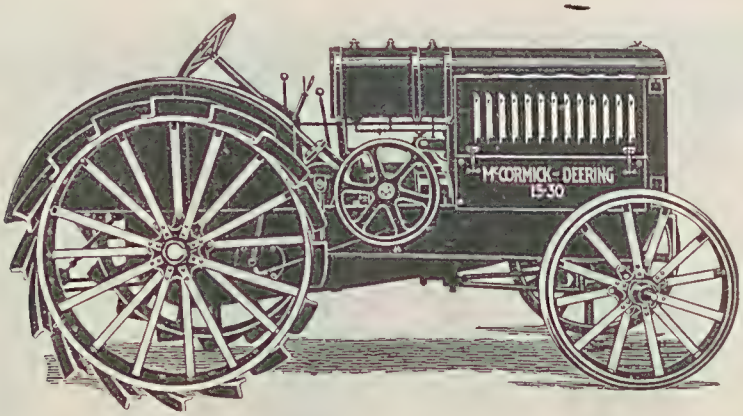

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OF

VICTORIA.

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WHEAT AND ITS CULTIVATION.

A. E. V. Richardson, M.A., B.Sc., Agricultural Superintendent.

I.

Wheat is the most valuable of the world's food plants. It has been cultivated from the very earliest times. On account of the peculiar physical and chemical qualities of its gluten, wheat makes a more palatable bread than any other cereal.

Rice is a staple article of diet for a large proportion of the human race, but the amount of wheat grown in the world is nearly double that of rice.

Wheat is displacing rice, rye, millet, and other grains as human food to such an extent that its production has become one of the most fundamental problems of the present day.

No problems in the realm of agriculture should be of greater moment than those relating to the production of our daily bread. Wheat is the most important staple crop of Australia, and the prosperity of the people and the stability of the finances are in a very large measure dependent on the success of the harvest. The world's normal production of wheat is approximately 4,000 million bushels; of this vast quantity Australia's normal contribution is but 2½ per cent. Although the wheat industry of the Commonwealth has made enormous progress during the past twenty years, it will be a long time before Australia's production will exert any appreciable influence on the price of wheat in the markets of the world.

Though the great wheat fields of the world are located in the temperate regions, between the parallels 30-60 deg. N. and 27-40 deg. S., wheat has been grown from the Equator to the Arctic Circle. It is produced on the Equator on the high lands of Ecuador, and as far north as 65 deg. N. in the Peace River Valley in Canada.

The greater part of the world's wheat supply is grown at relatively low elevation, *i.e.*, from 200 to 1,500 feet above sea level.

Of the world's total production of over 100 million tons more than one-half is produced in Europe, and over 90 per cent. in the Northern Hemisphere. Europe not only produces over 50 per cent. of the world's wheat, but the population is so great that she consumes the world's surplus in addition to her own production.

The World's Wheat Fields.

The world's great wheat fields are more or less level in character, thus permitting the use of large implements both for tillage and harvest. The more important regions of production are the following:—

1. The plains of Southern Russia and the Valley of the Danube.
2. North-Western Europe.
3. The Central Plains of the United States and Canada.
4. The plains of North-Western India.
5. The countries bordering the Mediterranean.
6. The Pampas areas of Argentina.
7. The plains of Southern Australia.
8. The Pacific coast of America.

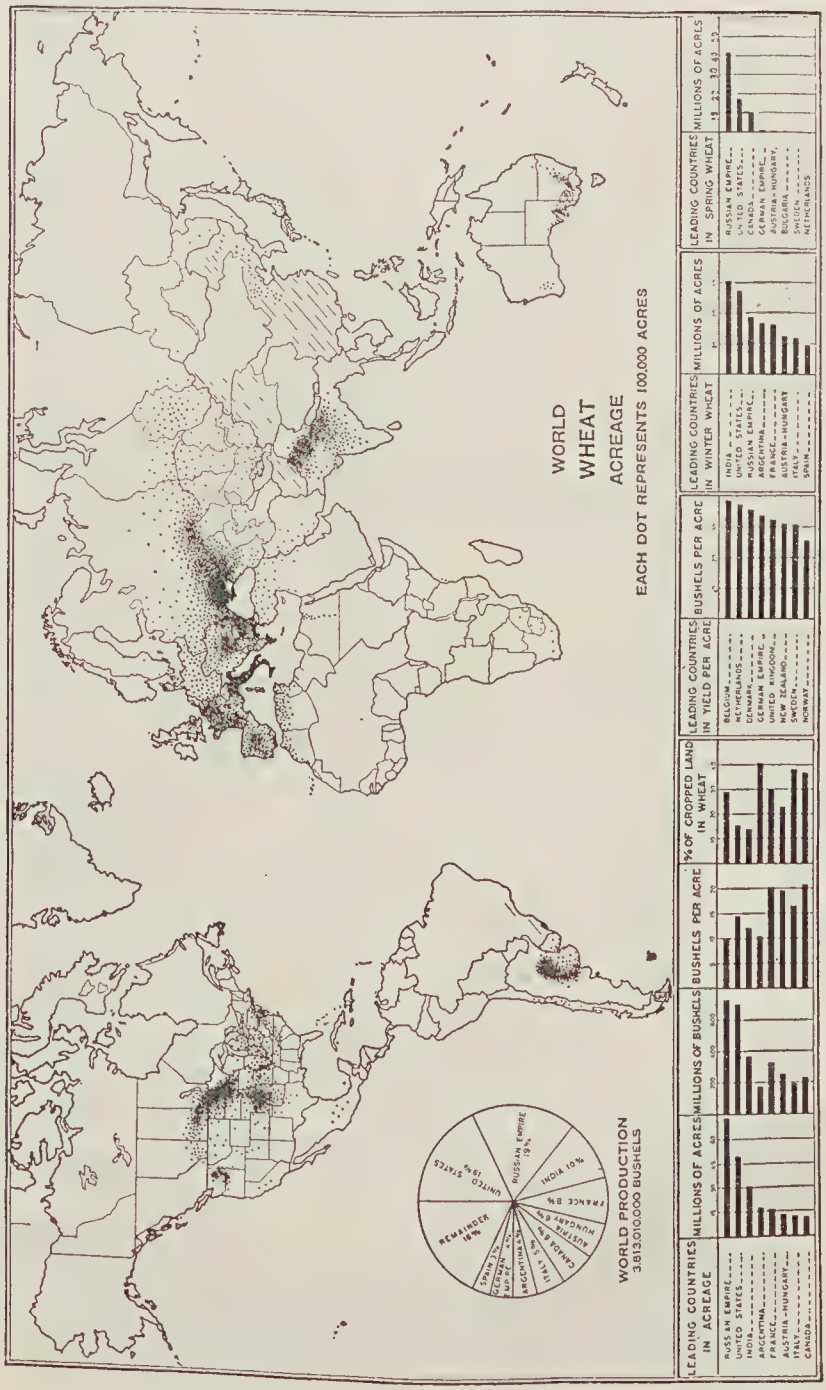
Of these areas North-Western Europe and the Mediterranean countries export no wheat. On account of their dense populations there is a heavy local demand. In five of the six remaining regions of surplus production the population is relatively sparse, the type of agriculture extensive, the land relatively cheap, and wheat is free from the competition of more productive crops.

In Europe the area under wheat is largest in the drier and warmer southern portions. Practically all the wheat of Western and Southern Europe is sown in autumn. The mild moist winters and dry summers in the Mediterranean countries furnish favorable conditions for the growth of winter wheat. Practically the whole of the acreage sown to spring wheat in Europe is located in the black-earth region of Eastern Russia.

The wheat belt of Southern Russia is the largest wheat region of the world. It extends from Bessarabia to the Ural Mountains, and the predominant type of soil is the Chernozium or black earth, a rich silty soil, dark in colour, with a high content of organic matter and of great moisture-holding capacity. Of the 325 million acres of arable land in European Russia, nearly 200 million acres are in the black-earth region. It constitutes one of the largest and most fertile areas of land in the world. The average yield of wheat is exceedingly low (under 10 bushels per acre), due partly to the somewhat erratic rainfall, but mainly to the primitive methods of cultivation and the ignorance of the peasants.

Since the construction of the transcontinental railway through Siberia the productive power of Asiatic Russia has become a matter of vital interest. Siberia is nearly twice the size of Australia, and has large areas where wheat could be grown.

Russia has great possibilities as a wheat producer, and her future progress will depend mainly on the social, economic, and educational progress of the country. The enormous areas of exceedingly rich soil



Map of the World Showing Distribution of the World's Wheat Acreage. (From U.S. Department of Agriculture.)

need only the application of thorough methods of cultivation to make them highly productive. Germany, with soils poorer than Russia, has an average yield per acre nearly three and a half times as great as that country.

The United States produces approximately 20 per cent. of the world's wheat supply. The centres of greatest production are Kansas, the Dakotas, and Eastern Washington. In these areas the rainfall varies from 15 to 25 inches per annum. The opening up of the American and Canadian prairies gave a great impetus to wheat production, and led to a lowering of price in the world's markets.

American production has in the past been a big factor in the world's wheat market, but her population is growing so rapidly that it is probable that she will cease to be an exporter of wheat within another generation.

Canada has an enormous area of wheat land, and it is estimated that 150 million acres could be profitably devoted to wheat. These areas are mainly located in the three prairie provinces, Saskatchewan, Manitoba, and Alberta. Owing to the very severe winters the greater part of the crop is spring-grown, but some winter wheat is grown in portions of Northern Alberta and in Ontario, where the winters are comparatively mild.

The wheat belt of Western Canada is limited on the north by the short growing season, and on the south by light and somewhat erratic rainfall.

The wheat belt in India lies in the north-west—the region of greatest extremes of temperature. Three-quarters of the total wheat of India is produced in the north-west provinces.

A considerable proportion of the wheat, especially in the Punjaub, is grown under irrigation. The acreage sown fluctuates considerably with the season. The dominant factor affecting the acreage is the character of the rainfall just prior to sowing. Good rains in September, just before the seeding season, results in extended sowings.

Famines affect the wheat acreage, because of the necessity of immediately renewing foodstocks by the growth of early ripening food grains, and because the growth of wheat involves the cultivator in a substantial outlay of capital.

Approximately 30 million acres are annually sown to wheat, the bulk of which is on grown alluvial loam soils. The wheat is usually sown in October after the monsoon rains, and is harvested from February to April. India consumes nearly all the wheat she produces.

The Argentine has an enormous area of flat fertile land and a climate which permits the land to be worked during most of the year. The wheat belt is located in a region of somewhat dry winters and moist summers. Seasons of severe drought occur, especially in the south. It is estimated that ultimately 60,000,000 acres of land will be devoted to wheat growing.

The Argentine Government conducted a vigorous immigration policy which prior to the war yielded 100,000 immigrants annually. The agricultural methods are primitive and the yield per acre low, but the land is rich, and Argentina is bound to become a big factor in the world's wheat market, and will be Australia's greatest competitor, for the crops of the two countries come on the market simultaneously.

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The Australian Wheat Belt.

Australia is so generously favoured by Nature that she must ultimately become one of the important wheat producers of the world.

The climate and soils of Southern Australia are highly suited to wheat growing. The rainfall of the wheat areas averages from 11 to 25 inches per annum; but of more importance than the total rainfall is its incidence. From 70 to 80 per cent. of the total rainfall occurs from April to October, the growing period of the wheat crop. During these months—the winter and early spring of the year—the evaporation from a free water surface is small, and in no part of the wheat belt are the temperatures low enough to retard the development of the crop. Though the rainfall is light, it is sufficient with the use of modern cultural methods to secure heavy crops.

The results of extensive investigations in Victoria have demonstrated that with moderate rainfalls each inch of winter rainfall is capable of producing more than 3 bushels of wheat per acre.

The ripening period of the wheat coincides with warm, dry, settled weather, enabling the crops to be garnered by the use of labour-saving harvesting machinery, which takes the grain from the standing wheat, and bags it in one operation. On most of the world's great wheat fields the weather conditions at harvest are so unsettled that the crop must be cut with a binder and threshed—a costly and labour consuming method of harvesting.

The dry warm weather results in the production of dry, hard grain of excellent milling quality, which has established an excellent reputation on the markets of the world.

The soils are mostly friable loams, and are fairly easily worked. The wheat lands are usually level plains or gently undulating areas which enable labour-saving cultivation and harvesting machinery to be used to great advantage.

The wheat belt is conveniently located within a short distance of the coast line, and the rail haulages to the seaboard are relatively short. In this respect Australian farmers have a great advantage over wheat-growers in the central plains of America and Canada. In some of the prairie States wheat has to be hauled over 1,000 miles to the elevators at the Great Lakes, and the cost of such lengthy rail transport is necessarily high.

To bring Australian wheat from the farm to the world's markets a relatively short-rail haulage and a relatively long ocean transport are necessary. Canadian wheat has to bear the expense of very long-rail haulage and a relatively short ocean transport.

Notwithstanding our great distance from the world markets, wheat has always been one of the important staple products of Australia. Approximately 65 per cent. of the total area under crop is sown to wheat. Including wheat sown for hay the proportion of wheat would exceed 75 per cent.

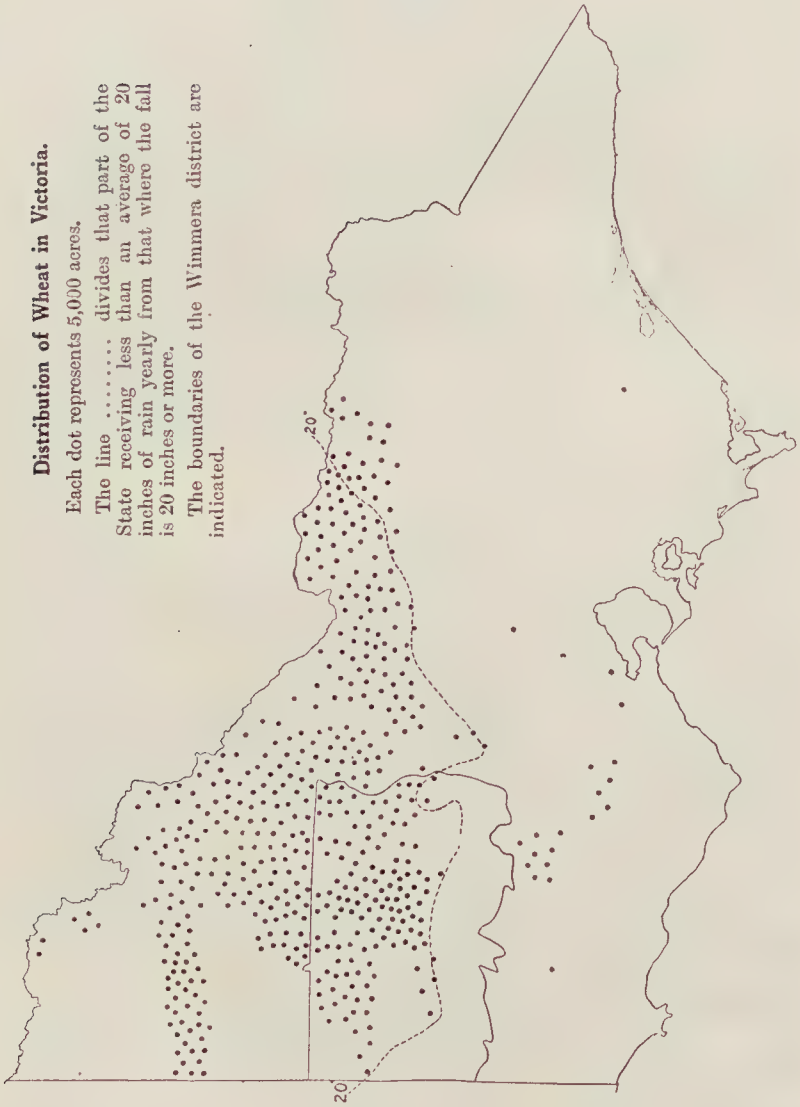
Wheat is an excellent pioneer crop, and it lends itself admirably to the extensive system of farming common to all comparatively new countries where, compared with densely-populated countries, land is cheap, individual holdings are considerable, and high-class farming is rarely practised, and where the object of the cultivator is to secure

Distribution of Wheat in Victoria.

Each dot represents 5,000 acres.

The line ..... divides that part of the State receiving less than an average of 20 inches of rain yearly from that where the fall is 20 inches or more.

The boundaries of the Wimmera district are indicated.



a relatively small average return from a large acreage rather than a heavy yield from a small area. With our multiple-furrow ploughs and large cultivation drills wide areas can be cultivated with the minimum of labour, and the complete harvesters enable the grain to be taken off with the greatest facility.

With the increase of population, and the inevitable increase in land values ahead of us, this system of farming will gradually be modified and a new era will be ushered in, characterized by smaller areas under individual cultivation and higher average returns per acre.

Under existing conditions of cultivation it does not require the exercise of much skill, or of a great deal of labour, to secure a payable crop of wheat, though it does require the very highest skill, ability, and intelligence to secure the maximum crop under the soil and climatic conditions of a given district.

As long as the wave of expansion continues in Russia, Canada, Argentine, and Australia enormous supplies will be raised for many years to come under pioneer conditions—under conditions of extensive farming—and it is owing to the capacity of these countries during the last generation for raising cheap wheat that wheat is being displaced from its position in the rotation systems of highly farmed and densely populated countries.

An additional reason for its popularity lies in the fact that for wheat there is always a ready market, and that, unlike many agricultural products it does not suffer by storage or transportation over long distances. Moreover, it is a most reliable crop, especially when treated in a rational manner, and being more resistant to drought than other cereals, it is more likely to succeed under arid conditions than other crops.

Finally, during the war prices were satisfactory, and the standard of efficiency in wheat cultivation has been considerably raised by the recognition of the value of fallowing, judicious crop rotation, rational soil cultivation, systematic manuring, and the use of suitable varieties of wheat.

The Australian wheat belt forms a more or less crescent-shaped area in the south-eastern portion of the continent, and a similar but much smaller area in the south-west. The larger area extends from the Darling Downs (Queensland) to Fowler's Bay (South Australia). The regions of intense production are the Wimmera and northern plains of Victoria and the coastal areas north of Adelaide, the Riverina and western slopes of New South Wales. The wheat area of Western Australia runs from Geraldton almost to Albany. It is located in a region of very reliable winter rainfall, and its existing boundaries have been determined by economic conditions, *e.g.*, rail transport facilities rather than by climatic conditions.

The inner margin of the Australian wheat belt is determined by aridity, and the outer margin by increasing humidity and mountain topography.

The principal factors controlling the distribution of wheat in Australia are the following:—

1. Climate (including rainfall, temperature, humidity).
2. Soil.
3. Transport facilities.
4. Competition of other crops.

Climate.

The rainfall of the wheat belt varies from 11 to 25 inches per annum, and from 7½ to 15 inches during what might be termed the growing period of the crop—April to October.

In Victoria and South Australia there is a marked coincidence between the boundaries of the present wheat belt and the 7½-in. and 15-in. lines of winter rainfall. In New South Wales and Western Australia, however, the inner margin of the wheat belt has barely passed the 10-in. line of winter rainfall.

The incidence and reliability of the rainfall is very important. In South-Western Australia the rainfall has a marked winter maximum, and over 80 per cen. falls in the growing period of the crop. The rainfall is also very reliable.

As we pass east through the wheat belt the proportion of winter rainfall in comparison with the total precipitation gradually falls.

On the western slopes and northern plains of New South Wales nearly half the yearly precipitation falls outside the crop-growing period. With the best methods of cultivation in vogue in the wheat belt a winter rainfall of from 11 to 13 inches appears to be the optimum for heavy crop production. In seasons with a winter rainfall in excess of 15 inches, crop yields as a whole are invariably lowered.

The total rainfall and its incidence must be considered in relation to the variability of the rainfall and the rate of evaporation. In portions of Western Australia the rainfall is most reliable, and shows only a 10 to 15 per cent. average deviation from the mean. In Northern New South Wales the rainfall is erratic and variable, and shows a deviation of from 25 to 30 per cent. from the mean.

Again, the rate of evaporation from a free water surface varies in different parts of the wheat belt. In Victoria the average annual evaporation in the wheat belt varies from 45 to 60 inches; in Northern New South Wales the evaporation in the wheat belt varies from 60 to over 80 inches. The increased rate of evaporation results in a higher transpiration ratio for wheat and a lower production of grain per unit of rainfall received.

The relationship of average wheat yields to winter rainfall will be discussed in detail later.

The existing wheat areas of Australia lie within the isotherms 60-67 deg. F. There is no extensive area of arable land in Australia too cold for wheat, though in the cooler districts other crops can be grown to greater advantage. No wheat is grown beyond the 70 deg. isotherm, though there is a considerable area of land north of the 70 deg. isotherm with a climate similar to the wheat-growing areas of India.

Humidity is an important factor, because wheat is very susceptible to attacks of rust in areas with high atmospheric humidity during the spring and early summer. The humid coastal areas of Southern Victoria and New South Wales are unsuited for wheat growing.

Soil.

In the absence of a soil survey of the wheat belt of Australia, it is not possible to state definitely what proportion of the area is arable and suited for the growth of wheat. The greater part, however, is of relatively low elevation and arable, and consists of soils ranging in

texture from light sandy loams to heavy silt loams and clay loams. Wheat grows best on the clay loams, and silt loams, and calcareous loams, especially when these soils are well provided with organic matter.

Transport Facilities.

The provision of adequate transport facilities has an important influence in determining the distribution of wheat. Wheat cannot be profitably grown in regions remote from railways. It is generally considered that it does not pay a farmer to cart wheat more than 12½ miles from a railway, that being the greatest return journey that can be reasonably accomplished with a load of wheat in a day. In regions more distant from rail or river transport, products of relatively high value per ton, *e.g.*, wool and meat, can be grown to better advantage than wheat, because the cost of haulage or marketing is small in comparison with the value of the product. Hence the factors which determine the present limit of the wheat belt are economic rather than climatic.

There are at present three areas in the wheat belt where the limits to the expansion are governed by transport facilities:—(1) Riverina, (2) North-West Mallee in Victoria, (3) a belt east of the existing railway systems in Western Australia.

The Riverina has an enormous area of land, with soil and climate suitable in every way for wheat-growing. Lack of rail facilities has hitherto prevented the expansion of the wheat industry in this fertile area. The construction of the recently-authorized Border railways will lead to immense expansion of wheat-growing in this territory.

The undeveloped Mallee areas of North-Western Victoria are situated in an area of low rainfall. With the adoption of good cultural methods the rainfall is sufficient to grow wheat profitably.

The influence of a developmental railway in stimulating wheat production in the Mallee is strikingly shown in the map illustrating the distribution of the wheat acreage in Victoria. For 12 miles on either side of the Ouyen-Murrayville line is a productive wheat belt; beyond this line is virgin Mallee. The climate and soil conditions in the undeveloped area in the north-western corner of the State are similar to the new Mallee country already developed. This area needs railway communications, water supply, and roads before it can be converted into new wheat territory.

East of the existing railway systems of Western Australia is an enormous area of country enjoying a rainfall of 10-20 inches during the growing period. The climatic conditions are similar in every respect to the existing wheat belt of Western Australia. Given soils favorable for wheat in this area, there is no reason why this vast stretch of country should not be brought to profitable production with the aid of developmental railways.

Competition of Other Crops.

In the higher rainfall areas the price of land and the competition of other profitable pursuits such as dairying, hay growing, oats, maize, &c., exercises a restrictive influence on wheat production. Along the southern and eastern littoral the land is more suited for mixed farming, dairying, and intensive agriculture than for wheat-growing. Hence, with the exception of isolated dry areas on the Western and Gippsland

plains of Victoria, where the rainfall ranges from 18-25 inches, no considerable quantity of wheat is grown south and east of the Dividing Range.

The price of wheat in relation to other commodities is a very important factor in determining its production. So also is the yield of wheat per acre. Wheat prices are determined by supply and demand in the world's market, and consequently are outside the control of the farmer. Yields are determined by the season and the efficacy of cultural methods.

With the spread of agricultural education and the application of scientific methods to wheat production, the average yield per acre may be greatly increased before the limits of production imposed by the rainfall are approached.

The Wheat Belt of Victoria.

The wheat belt of Victoria comprises the more or less level and slightly undulating areas north of the Divide, together with the lighter rainfall areas on the Western Plains and Central Gippsland. The northern area, which produces approximately 90 per cent. of the total wheat of the State, comprises (1) the Mallee, (2) the Wimmera, (3) the Northern Plain.

The rainfall of the wheat belt varies from 10 inches in the north-west to 25 inches in the Western Plains and Central Gippsland. The rainfall of these districts is as follows:—

Mallee	10-15 inches.
Wimmera	15-21 inches.
Northern Plain	15-21 inches.
Western Plain	19-25 inches.
Gippsland	21-25 inches.

The incidence of the rainfall is very favorable. In the north-western Mallee areas 70-80 per cent. of the annual precipitation occurs from April to October—the growing period of the wheat. During this period temperatures are mild, and evaporation from a free water surface small. The rainfall is therefore very effective, and a close relationship exists between the winter rainfall and the crop yield.

The wheat belt was formerly covered with more or less dense scrub, which varied with the type of soil and the rainfall. Very little now remains of this former covering. The pioneer with his axe or his mallee roller has subjugated the scrub and converted the land into cultivated farms. Occasionally one meets with the remains of the virgin scrub in shelter paddocks, water and forest reserves, and on uncleared roads, while the remains of ring-barked trees are a feature of many pastoral properties. The scrub was either destroyed by the pioneer or used for fencing and firewood.

The nature of the vegetation varied considerably in the various parts of the wheat belt, mainly with the variations in soil and rainfall.

The Mallee.

Approximately eleven million acres of land in the north-western portion of the State were formerly covered with mallee scrub.

The Mallee fringe—a transitional area separating the Mallee from the northern plain and the Wimmera—extends from below Swan Hill on

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the Murray, through the neighbourhood of Boort, Charlton, Donald, Warracknabeal, and Nhill. The surface of the country is usually gently undulating, with fairly-well defined sandy ridges running east and west in the north-western portion.

The land was originally covered with a dense scrub of more or less dwarf eucalyptus, varying in height according to situation and quality of soil. There is a close correlation between the character of the vegetative covering and the quality of the soil. The richer soils were clothed with strong mallee scrub, interspersed with pine (*Callitris*), belar and buloke (*Casuarina*), whilst the poorer tracts were covered with sparse mallee, and the lighter sandy areas with dwarfed mallee broom (*Baeckea*) and heath (*Epacris*) and False Spinifex (*Triodia*).

In portions of the area various species of saltbush occur, either in stretches of plain or interspersed with mallee scrub. The soils of these areas invariably contain a high content of soluble salts. On stiff soils with high saline content bluebush (*Kochia*) is the dominant vegetation.

The principal types of eucalypt met with are *Eucalyptus dumosa* (dumosa mallee), *Eucalyptus gracilis* (white mallee), *Eucalyptus calycogona* (red mallee), *Eucalyptus incrassata* (yellow mallee), *Eucalyptus uncinata* (hooked mallee) and *Eucalyptus oleosa* (oil mallee). Near Dimboola the narrow leafed red mallee (*Eucalyptus leptophylla*) and the Silver mallee (*Eucalyptus Floctoniæ*) are met with, and near Nhill the Desert mallee (*Eucalyptus angulosa*) is found.

The presence of casuarinas and pines usually indicates good land. The principal types met with are the Belar (*Casuarina lepidophloia*), Grey Buloke (*Casuarina glauca*), and the Mallee Pine (*Callitris verrucosa*).

Other characteristic flora of good soils are Sandalwood (*Myoporum*), Quandong (*Fusanus*), Cabbage Bush (*Heterodendron*). On the poorer soils are to be found desert hakeas, banksia, porcupine grass (*Triodia*), and Heath (*Epacris*).

The Wimmera and Northern Plain.

The Wimmera and Northern Plain are fairly level areas with a gentle slope from the foothills of the Divide to the Murray River. From the Wimmera to the Loddon Rivers the country was a more or less open plain, interspersed with gum, sheoak, and grey box. The Northern Plain was originally timbered country, but treeless areas known as "scalded plains" occur in the northern areas, and swampy areas were met with in the depressions.

Grey Box (*Eucalyptus hemiphloia*) was the dominant eucalypt on the plains, and Red Gum (*Eucalyptus rostrata*) along the water-courses and rivers. Several species of Casuarina occur, interspersed among the box, particularly in the Wimmera. Among the more common of these are the Buloke (*Casuarina Luehannii*), Drooping Sheoak (*Casuarina stricta*), and Black Sheoak (*Casuarina suberosa*). On the lighter lands, and particularly on the northern plains, various species of pines (*Callitris*) are met with. On isolated ridges towards the mining areas Ironbark (*Eucalyptus sideroxylon*) occurs.

The Western Plain.

The wheat areas of the Western Plains comprise an area of low rainfall country extending from Port Phillip Bay to Ararat. The area was either treeless or very lightly timbered. Though naturally treeless, fine plantations of Sugar Gums (*Eucalyptus coronocalyx*) have been established, and on better classes of soil blue gums and pines have done exceedingly well.

The soil of the western wheat area is practically all volcanic in character, with an admixture of small rounded ironstone pebbles called buckshot. These buckshot plains extend from Bannockburn to Dunkeld, a distance of 90 miles. On the eastern side the plains are approximately 20 miles wide, at the western from 40 to 45 miles wide. Owing to the heavier rainfall and higher atmospheric humidity of the western plain, bare fallowing is not so essential for profitable wheat production, and fodder crops may be raised with greater prospect of success than is possible in the northern areas.

Central Gippsland.

Central Gippsland forms a small detached part of the wheat belt, resembling the western plain in climate, rainfall, and in the level character of the surface, but the soils are wholly alluvial in character. Owing to the competition of other profitable crops and mixed farming, the wheat production of this area is restricted.

(*To be continued.*)

FOREST INSECTS OF AUSTRALIA.

The book, *Forest Insects of Australia*, a collection of the entomological writings of Mr. W. W. Froggatt, the Government Entomologist of New South Wales, is another valuable contribution to our knowledge of Australian injurious insects. In view of the importance of protecting our indigenous and imported timber trees from destruction by insect pests, the publication is most opportune. It deals fully with the insects that attack the various trees to be found in the forest, as well as with those that bore into and destroy seasoned timbers. It is very profusely illustrated with enlarged photographs of insects, &c., and of specimens of trees and timbers that have been attacked.

It is rather unfortunate that the author did not mention more of Australia's beneficial insects. Mr. Froggatt deals with some of the parasites that assist in controlling timber insects, but the value of the book would have been greatly increased had it included some of the more important of our predatory insects, so that these might have been made more familiar to those interested in timber conservation.

The book, which has been issued by the Forestry Commission of New South Wales, is obtainable from the Government Printer, Sydney. Its price is seven shillings and sixpence.

MURRAYVILLE CROP AND FALLOW COMPETITION.

Report of the Judge, H. A. Mullett, B.Ag. Sc., Senior Inspector of Agriculture.

The members of the Murrayville Agricultural and Pastoral Society have recognised that the time has now arrived in the evolution of their district when a concerted effort should be made to replace the rough and ready wheat-growing methods peculiar to Mallee pioneering by more highly organized farming practices. In other words, they realize that when the pioneering stage is over, wheat-growing in the Mallee need no longer continue to be a compromise between good farming and other practical necessities of the moment, such as killing mallee shoots.

A Comfortable Mallee Residence, Cowangie.

The district has been brought under the plough during the last dozen years, and in that time it has been converted by men, equipped with little more than mere tenacity of purpose, from an arid scrub-covered wilderness into a fertile wheat province dotted with prosperous farms. By such only the crudest methods could be practised—those which yielded the quickest cash return for each acre cleared and sown to wheat, with least cost for plant and implements. They were methods, to illustrate further, under which it has been obligatory to grow long stubbles during each of the first three or four years on every cleared paddock so as to permit of the cheap eradication of the mallee shoots by stubble burning. And so on. All along the line has good farming had to remain subject to the necessity of subduing the bush and to the limitations of a slender exchequer.

Needless to say, though the returns have been light, yet by the exercise of rigid economy they have been sufficient in most cases to place the grower firmly on his feet.

But many cannot now bring themselves to modify the methods which have served them well enough so far. The reduction in the acreage sown to wheat which the more thorough farming of each acre entails is naturally a stumbling block to those who have been accustomed to measuring their returns in terms of the number of acres sown.

It has not yet been realized that 250 to 275 acres of wheat per team sown on well-worked fallow is better than 500 acres scratched in on

stubble, or than 400 acres on rough fallow. The sowing of the land to successive crops of the same species without adequate rotation is bad farming practice. It fosters the spread of disease and of weeds, and it places an undue strain on the fertility of the land. It cannot be continued indefinitely without yields declining substantially. Weeds such as wild oats, charlock, &c., have spread to an alarming extent in the Mallee. That they have done so inside of a dozen years is a striking commentary on the unsuitability of the present methods. But far more serious is the rapid increase in the ravages of Takeall (*Ophiobolus graminis*), and to some extent Flag Smut. So extensive has been the damage done by these diseases that the more thoughtful among the "new" Mallee settlers feel that the time has now come when a halt must be called.

Takeall is a fungous disease that cannot propagate itself in the absence of a living host. Wheat is one, barley is another, rye another; so also are certain grasses, *e.g.*, barley grass, spear grass, &c. Hence one result of sowing stubble land too often to wheat, as has been done

A Mallee Farm Home, Murrayville.

in the "new" Mallee, is that the multiplication and spread of the disease has been rendered comparatively easy. So also is it where neglected fallow is permitted to grow barley grass—the most common weed in the new Mallee. From a weed and a disease preventive point of view, to say nothing of a soil fertility one, a rotation system is necessary, in which a clean fallow precedes wheat and in which an occasional crop of oats is grown.

Rotations which amount to wheat, barley grass, wheat or fallow, wheat, oats (with barley grass through it), are unsatisfactory, for the Takeall is thus supplied with a host plant each year and hence can multiply indefinitely. The fallow must be kept quite free from weeds and the oat crop sown thick enough to suppress all undergrowth if the rotation is to be useful as a method of suppressing disease.

Already a number of the more progressive farmers have begun to grow oats as a rotation crop, and in general to farm more systematically. It is with some of these problems in mind, and with a view to fostering the spread of better farming, that the Society has arranged these Crop and Fallow Competitions.

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The District.

Murrayville has a rainfall of about 13 inches annually. The soil is a reddish loam with occasional sandy rises, with good clay loam flats between them. To the east of the town limestone outcrops occur on a good deal of the land. There some of the cultivation paddocks require to be cleared of stone as well as of mallee stumps. The land has been well cleared, and from any commanding hillock an extensive view of rolling grass land and of wheat crops and fallows can now be seen. The district enjoys an advantage unique in the Victorian mallee, in that artesian water of good quality can be tapped by boring several hundred feet deep. Almost every farm in the district has its bore.

Well-grown shade trees are a feature of each homestead, and almost all have a small orchard and a vegetable garden. The garden and orchard about the homestead of Mr. Gutsche is a revelation of what can be done with water on mallee soils. The accompanying photograph illustrates the point.

The type and general extent of the improvements on the farms testifies to the soundness of the district.

Mr. Gutsche's Picturesque Home.

The Competition, 1923.

Seven crops and nine fallows were judged. In addition to these a number of others were entered, but were withdrawn later when, for various reasons, they did not reach the standard expected earlier. Competitors were required to submit 75 acres of wheat for the crop competition. For fallow, 100 acres was the area fixed. Owing to the variable nature of the soil on the various farms, some difficulty was experienced in making fair comparisons between the exhibits. Some were on old wheat land and some on new. This may be reflected in the character of the yields obtained next year when crops are sown on them.

The Awards.

In the section for wheat crops, a paddock of Sailor's Fortune wheat grown by Mr. J. Holmes was placed first with 80 points out of a possible 100. This crop was well grown, of a satisfactory standard of purity, quite free from weeds and undergrowth, and comparatively free from disease, though a little flag smut was noticed amongst it.

Mr. T. E. Cox, of Panitya, was a close second with 79 points. This crop (Late Gluyas) was estimated to yield a bushel or two per acre heavier than that of the winner, but was not so good in some other respects. It was reasonably free from foreign varieties, but some weeds, mustard and poppy, were present, and there were a few patches of Takeall. Then follow T. E. Eichler, B. Zanker, and others.

Details of Awards—Best 75 Acres of Wheat.

Name.	Yield.	Purity.	Absence of Weeds.	Absence of Disease.	Evenness.	Total.
Maximum Points	**35**	**20**	**15**	**15**	**15**	**100**
J. Holmes	26	17	15	12	10	80
T. E. Cox	28	18	12	12	9	79
T. E. Eichler	24	16	13	13	8	74
B. Zanker	25	14	12	12	8	71
S. Baldwin	23	11	11	9	9	63
F. A. J. Pahl	11	15	7	9	4	46
A. Job	10	11	11	4	5	41

Mr. Holmes treated the land on which he grew his winning crop as follows:—It was carefully ploughed in July to 4 inches, and then harrowed. In the spring the paddock was scarified, then harrowed, and in October it was again scarified and harrowed. In the following May the scarifier was used to work up the soil; the seed was drilled in mid-May and then the harrows were used. 60 lbs. of wheat with 60 lbs. superphosphate was the dressing of seed and manure respectively. It will thus be seen that this crop was grown on a fallow which was thoroughly cultivated.

Mr. T. E. Cox's crop of Improved Gluyas was grown on fallow thus: Ploughed to 3 inches deep in August, harrowed twice, then part was spring-toothed. Sheep had access to the fallow and assisted to consolidate the under layers of the soil and to suppress weed growth. The seed was sown in mid-May with a combined spring-toothed cultivator drill at the rate of 70 lbs. per acre, with 130 lbs. superphosphate. Prior to seeding this crop, the paddock grew a crop of oaten hay. The excellent yield—the heaviest in the competition—is ascribed to a combination of judicious cultivation with the use of sheep, backed up by a liberal dressing of seed and fertilizer. The soil was a good red loam.

Mr. T. E. Eichler's crop comprises Teagle's Red, Major Florence, and Gluyas varieties. The land was well fallowed and "sheeped." 60 lbs. of seed was used, with 90 lbs. of superphosphate per acre.

Mr. B. Zanker's wheat comprised Mac's White, Improved Gluyas and Federation. It was raised on a paddock where oats had been grown recently. 60 lbs. of seed and 90 lbs. of superphosphate were drilled in.

The Fallows.

Mr. H. J. Wiltshire was awarded first prize, with 90 points out of a possible 100; Mr. C. H. B. Ross was second with 89; then followed Messrs. W. Jacob and F. A. J. Pahl. The winning fallow was portion of a piece of land which has so far grown only two wheat crops. It had been very thoroughly worked, if somewhat too deeply ploughed, though no lack of consolidation was apparent from this cause. The

paddock was ploughed to 4½ inches deep in July, then harrowed. During early August it was worked with a scarifier and harrowed. The scarifier was again used in the first week in September; then a stroke with the harrows was given. Later on part was spring-toothed and part harrowed. The treatment was much more thorough than that usually given Mallee land, and it will be of interest to see what sort of a wheat crop can be grown as the result of such cultivation. The moisture content was high, the mulch of mellow texture, if somewhat shallow in parts, and the consolidation good.

Mr. C. H. B. Ross' fallow was part of a paddock of strong red land. It was ploughed in August to 3½ inches deep, and harrowed. In September it was scarified and harrowed. Later it was spring-toothed, harrowed, and finally spring-toothed once more. This fallow had a fair moisture content; if anything the dust mulch was of somewhat harsh appearance, but had sufficient depth—about 2½ inches.

Merino Rams at the Farm of Mr. F. A. J. Pahl.

There was an almost complete absence of weeds, and the seed bed below the loose soil was notably well consolidated.

Mr. W. Jacobs' fallow consisted of sandy rises of fair fertility, with good flats of red sandy loam between. The moisture content of the fallow was the best in the competition. The mulch was regular in depth, but the under layers were deficient in consolidation. The paddock was ploughed to 3 inches in July and August, then harrowed. Subsequently it was spring-toothed twice in October.

The fallow exhibited by Mr. F. A. J. Pahl had a mulch of mellow texture, but somewhat on the deep side. The tines of the spring-toothed cultivator had worked to irregular depths, owing to some of them having been straightened somewhat by contact with stumps. The seed bed in consequence showed a very irregular bottom.

The fallow shown by Messrs. D. Stewart and Sons had been thoroughly cultivated. The mulch appeared somewhat harsh in texture.

The exhibit of Mr. A. Job looked well; there was good consolidation below, but the barley grass had been killed late in the season.

Mr. T. E. Cox's fallow is located on a good red flat between rolling sand hills.

Fallowing in the Mallee—Moisture, Consolidation, and Weed Suppression.

The maximum profit will not be made by wheat-growers in the "new" Mallee until every acre that they sow is on skilfully-prepared fallowed land. Settlers in the older settled Mallee have proved that beyond all doubt. The main object of fallow in districts of low rainfall is to conserve as much as possible of the rain which falls on the fallow, so as to place it at the disposal of the wheat crop the following year. Water rapidly evaporates from soil and escapes into the air unless steps are taken to arrest its ascent in the soil by maintaining a layer of loose soil on top of the land. If this is carefully done, up to 4 inches more rain can be conserved in the soil as compared with a paddock where the fallow is neglected. But care must be exercised to ensure that the continual working of the fallow is not done too deeply. If wheat is sown on a deep, loose seed bed in the Mallee, it does not continue to grow vigorously, and appears to be very subject to the Take-all disease. A satisfactory fallow will be created if the soil is not ploughed to more than 3½ inches in the first instance, and repeatedly

A Heavy Crop of Improved Gluyas Wheat.

worked over after rain to a shallower depth, so that about 2½ inches of loose soil remain on top. It is not enough to allow the implements to merely tear up the soil. Their depth levers should be constantly regulated to maintain an even depth on all types of soil occurring in the paddock. Especially should they be prevented from plunging deeply into loose sandy patches. Sand rises, of course, require the least treatment and heavy flats the most. It is often argued that Mallee fallows should not be cultivated finely because they tend to blow. That, of course, must be guarded against, but experienced men have found that reasonable degree of fineness can be obtained, and yet blowing can be largely prevented by leaving the land ridged at right angles to the direction of the prevailing wind. It is important to cultivate the fallow as far as possible only when it is reasonably moist. If cultivated then, it will be found to consolidate better below, and that a better texture of the top soil will result. It will then have what has been termed a "mellow" appearance; besides, it will contain more moisture.

Again, the earlier the original ploughing is done the better. In fact, it would probably pay to summer-fallow a good deal of the Mallee

soils. For this purpose the land is either ploughed or cultivated in March or April, and subsequently worked as an ordinary fallow. Thus the land lies fallow 14 or 15 months. Another reason why the fallows should be kept well worked is to keep them free of weeds, especially the Takeall host, barley grass.

Takeall is proving a serious menace in many districts in the "new" Mallee. The cause has already been discussed. The cure will not be found until the fallows are kept free from barley grass and other weeds, and until a systematic rotation with oats is followed. Already a number of farmers at Murrayville have begun to grow oats regularly. Some have been forced to crop the whole farm to oats for a year or two before wheat could again be grown. Several of the heaviest crops in the competition were preceded by a crop of oats.

Where a crop is infected, the stubble should be burnt as far as possible, and the land then summer-fallowed. In bad cases, a crop of oats will be needed before it is safe to sow to wheat again, and this should not be sown on the oat stubbles, but after fallow. Spelling the land in grass is worse than useless.

Stud Wheats Grown at the Murrayville State School under the Supervision of Mr. Lorensini.

Seed Wheat.

Wheat farmers in the "new" Mallee cannot be complimented on the standard of purity of the wheat they grow, nor in many cases on the varieties used. Most of the crops seen in the district contained an undue proportion of foreign heads. There is urgent need for the introduction of pedigreed seed wheat of approved varieties from the seed stations.

The results of the Government tests at Cowangie, for the period 1918-1922, are as follow:—

Gallipoli	... ...	22.7	bushels per acre.
Selected Federation	... ...	20.8	,, ,, ,,
Penny	... ...	20.1	,, ,, ,,
Mac's White	... ...	19.1	,, ,, ,,

They indicate clearly that there are varieties available which yield more than standard Mallee varieties like Mac's White.

SHEPPARTON CROP AND FALLOW COMPETITION, 1923.

Report of the Judge, H. A. Mullett, B.Ag.Sc., Senior Inspector of Agriculture.

Though wheat is gradually being superseded by irrigated crops in the Shepparton district, enough of it is still grown to warrant the local Agricultural Society putting forth its best efforts to promote the growth of better crops of it there.

Because considerable extensions of the irrigated area are expected some time in the future, land values have risen in sympathy. Already in many parts of the district they have reached a level which is not justified from the wheat-producing capacity of the soil under dry-farming conditions by the use of existing methods. The values are purely speculative. In the meantime, the owners of this land find that to make ends meet until the water is made available—and it may take years—bigger crops of wheat are essential.

The magnificent progress made in wheat-growing in the Wimmera in recent years has undoubtedly encouraged members of the society to believe that they can bring about similar improvement at Shepparton, and possibly later on throughout the length and breadth of the Goulburn Valley.

Two methods of fostering increased production which admittedly have played an important part in the progressive development of the yield of wheat in the Wimmera are crop and fallow competitions and field experiments. Some members of agricultural societies in the Goulburn Valley who have visited the Wimmera have returned very much impressed with the value of the work done there. It has been demonstrated that many wheat-growing problems can be solved in the course of a few years by means of accurately conducted field tests, and the information gained can be spread by means of the press and by personal canvass.

So far two annual competitions have been arranged by the society, and this year a set of experimental plots relating to varieties and fertilizers was installed by the Department of Agriculture on the farm of Mr. T. Roe at Shepparton. Already there is ample evidence that the work is likely to succeed, though better methods of working the stiff clay soils still present a difficult problem. There is no doubt, however, that any really friable soils, especially where they have a good clay sub-soil, could be farmed in the Wimmera style save in the matter of late sowing, though in and around Dookie, in the territory embraced by the competition, there are soils where even to this detail Wimmera methods may be applied This is illustrated by the remarkable success this year of certain crops grown on the black soil at Dookie and Cosgrove, where for the first time, and as a result of the crop and fallow competitions, Wimmera methods were used in their entirety. These crops are comparatively free from excessive straw development, and are dense and level. The heads are closely packed together and filled with plump grain. They are quite free from weeds of any sort. The yield of grain must be exceedingly heavy.

Such are the crops grown on the black soil flats by Messrs. J. Knox and Bennett Bros., both competitors in the Shepparton competition.

They have excited considerable interest in the locality. The apparently backward appearance of these crops earlier in the season was the subject of derisive comment by some who sowed their crops much earlier and with lighter dressings of seed and fertilizer. However, the strong, clean, healthy appearance of the Wimmera-style crops later on in the spring soon caused the majority to suspend judgment for the time being, and later on to admit without reservation that the new methods had come to stay.

The season was a most unfavorable one in which to try out the late sowing part of the new method, because the rains did not commence until unusually late, and when once started there were very few days on which it was fit to sow until well on in August. Consequently the wheat practically had to be pugged in, yet it came through the cold, wet conditions during the period of germination and early growth satisfactorily. As no more severe test could have been devised, and as the conditions were unprecedented, it follows that the method can be adopted with complete assurance of regular success on these particular soils.

Attractive Farm Homestead—Mr. T. Davies', Undera.

So far as the stiffer soils are concerned, it is not possible yet to announce the same satisfactory progress; but this much is certain, as has been repeatedly stressed in these reports, that Wimmera methods cannot be applied to them without considerable modification. The great point of difference between them and the black soils, apart from their lower plant food content, is their somewhat unsatisfactory physical condition. The surface soil is readily set down by rain, especially if it has been worked at all fine, and because of the comparatively low permeability of the clay sub-soil the upper layers of the soil are easily water-logged in winter. Hence any method designed to improve the yield of wheat on them, which ignores these facts, is doomed to failure.

Some Goulburn Valley farmers, in a burst of enthusiasm following a visit to the Wimmera, worked their fallowed land over so often that it was reduced to a dust-like powder, which in a season like the present was apt to be puddled down flat with the heavy rain. Consequently the germination has not been as good as it should be, while the tillering

has been unsatisfactory and the growth of the plants stunted. On the other hand, some farmers who merely left the land in a comparatively rough state have had more satisfactory results. Indeed, in a few instances in comparatively new land fairly good crops have been grown on roughly-ploughed stubble land. Some of these were inspected, but generally proved to be very patchy. And in this connexion it should be stated that the section of the competition which limits entries to 20 acres of crop is most unsatisfactory. Any inference drawn may be entirely misleading. Seeing that most farmers sow from 200 to 300 acres of wheat, it can scarcely be regarded as a test of method when competitors are permitted to pick out a mere patch of 20 acres of good wheat, say, on a rich patch of soil, while the balance of the crop is not nearly so good. Surely at least from 30 to 50 per cent. of the total crop should be the minimum required.

The Winning Crop—Mr. J. Knox's Cosgrove. Minister—53 Bushels Per Acre.

The section of the competition under which 50 acres of fallow is judged as well as the crop grown on it the following year is commendable. This renders it necessary for competitors to nominate a year ahead the paddock upon which the crop will be grown. It is worthy of note that the fallows on which were grown the winning crops in both sections this year had been entered the year before either in the Shepparton or the Dookie societies' competition, and had won prizes—Messrs. Bennett Bros. first in the Shepparton competition, and Mr. Knox's first at Dookie.

Awards.

For Best 20 Acres of Wheat.

The first and second prizes go to Mr. J. Knox, of Cosgrove, for his exhibits of Minister and Joffre wheats, respectively. Minister gained 97 points and Joffre 90. Mr. H. Kerr, "Arcadia Homestead," was third with 89 points. The crop was Federation.

Details of Award—Best 20 Acres Wheat.

Name.	Yield.	Purity.	Weeds.	Disease.	Evenness.	Total.	Variety.
Possible Points	**35**	**20**	**15**	**15**	**15**	**100**	
J. Knox ..	35*	17	15	15	15	97	Minister
J. Knox ..	30	18	14	15	13	90	Joffre
H. Kerr ..	29	19	14	14	13	89	Federation and Longerenong
Baxter Bros. ..	26	17	11	15	15	84	Major
T. Davies ..	22	19	11	12	15	79	Federation and Longerenong
A. Taylor ..	21	17	14	12	14	78	Minister
J. Leahy ..	22	18	12	12	14	78	Major
Baxter Bros. ..	24	13	14	12	14	77	Federation
Florence and Williamson	20	19	11	13	12	75	Canberra
A. Mactier ..	16	18	10	13	15	72	Austan and Moira
D. Mactier ..	19	18	12	8	15	72	Dollar and Austan
A. Taylor ..	23	15	11	10	13	72	Major
T. Mellerick ..	16	17	13	14	10	70	Bomen
Florence and Williamson	14	19	13	12	11	69	Major
W. A. Trewin ..	14	15	14	10	13	66	Federation

Note.—The winning crop yielded 53 bushels per acre.

The winning crop was short, dense, well headed, and entirely free from any weed growth. Though short, there was a tendency towards lodging, which indicates that on black soil this variety is an unsuitable one.

The accompanying picture gives some indication of the appearance of the crop. It was grown on a well-worked summer fallow on black soil, treated as follows:—Ploughed in March, then scarified with shear-type of scarifier in July, again in September and again in October, as weeds appeared. In the following March the paddock was harrowed, then scarified early in June. Drilling commenced on 27th June, then the harrows were used. Seventy-four lbs. was the weight of seed, applied with 122 lbs. of superphosphate. The wheat contained an odd "stranger."

The paddock of Joffre was also good, but was considered to be somewhat lighter in yield. It appeared to be slightly tipped, and was lighter on a patch of red soil. The winter fallow was ploughed in September, harrowed twice, then scarified and harrowed in May, re-scarified in June, and also in July. Finally it was drilled on 25th July and harrowed. Eighty lbs. of seed were used, with 122 lbs. of superphosphate.

The third prize crop, Federation, from seed obtained from Longerenong College direct, was grown by Mr. Kerr on a rich piece of practically virgin soil on the banks of the Goulburn. The land had been lying out in grass for many years. The crop was very tall and well-headed; it was practically free from foreign varieties and weeds.

On the lower-lying land it was very dense, and lighter on the rises. It was grown on winter fallow, which had been disc-ploughed in August and then rolled. In June the following year the land was re-ploughed with the same plough to between 3 and 4 inches deep, then harrowed, drilled, and re-harrowed. The seed was drilled during the third week in June at the rate of 90 lbs. per acre, with 60 lbs. of superphosphate.

Messrs. Baxter Bros., Mooroopna North, entered two crops, Federation and Major, respectively. Both were fairly heavy, though somewhat impure. The Major appeared the better, and was very regular throughout.

The fallow on which the crops were grown was ploughed to 4½ inches deep in June, then harrowed; it was disc-cultivated in December. In the following May the land was spring-toothed up, drilled early in June, then harrowed. Sixty-five lbs. of seed wheat were used, with 80 lbs. superphosphate.

Mr. H. Kerr's Crop of Federation.

Mr. T. Davies, Undera, was allotted 79 points for his crop of Federation. The fallow was ploughed rather more deeply than usual, and well worked. Sixty lbs. of seed wheat per acre, obtained from Longerenong College, was drilled in early in May, with from 80 to 90 lbs. of superphosphate. The wheat was of good type, and the yield satisfactory. A few points were deducted for the presence of weeds and a little "take-all."

Mr. A. Taylor's crops, Minister and Major, should yield well. They were grown on well-worked fallow and liberally seeded and manured. The land was fallowed in July to 4½ inches deep; it was harrowed three times with heavy harrows during the spring, and then spike-rolled. In the autumn the paddock was worked up with a spring-tooth cultivator, rolled, drilled, and harrowed. For Major 70 lbs. of wheat was used, with 100 lbs. of manure; for Minister 75 lbs. seed with 120 lbs. superphosphate.

Mr. Taylor is conducting some experiments in summer-fallowed land on his property. The appearance of the fallow to date is satisfactory.

Mr. J. Leahy showed portion of a paddock of Major grown on comparatively new land on stubbles. The stubbles were burnt, the land spring-toothed, and the wheat drilled early in May. Eighty lbs. of seed and 102 lbs. superphosphate were used. The rest of the paddock appeared lighter in yield than the part shown.

Section II.—Aggregate Award for 50 Acres of Fallow, 1922. Crop on the Same Fallow, 1923.

In this section the competition extends over two years. Fifty acres of fallow are submitted to the judge one year, and the crop on the same fallow the next year.

Crop of Federation—Messrs. Baxter Bros., Mooroopna North.

Results.

Messrs. Bennett Bros. secured the first and second prizes with 185 and 176 points respectively. Mr. T. Mellerick was third. Then follow Mr. T. Roe and Messrs. Bennett Bros. No. 3 entry.

The winning crop comprised Federation and Wannon varieties. These were grown on a black soil flat with some red patches. Both varieties were very heavy, and should yield over 40 bushels to the acre for the 50 acres. The crops were short, dense, level, and regular, and entirely free from undergrowth, and practically free from wild oats. The Wannon appeared particularly heavy, and was very pure. In the Federation some "strangers" were noticed.

In growing this crop, Messrs. Bennett Bros. have closely followed the best Wimmera practice for this class of soil. The land was summer-fallowed with a disc-cultivator in March. In August the paddock was ploughed to 3 inches deep, harrowed in September, spring-toothed in October and harrowed; harrowed in January to arrest cracking, harrowed in March, and again in May. In June the paddock

was worked up with a Wimmera type of scarifier and harrowed twice. Drilling took place from 28th June to 26th July; 74 lbs. of Federation and 76 lbs. of Wannon graded seed, direct from Longerenong College, being used with superphosphate at the rate of 171 lbs. per acre. The rainfall recorded up to the end of November by Messrs. Bennett Bros. was 15.61 inches. The distribution was as follows:—January, 22 points; February, 0; March, 3; April, 0; May, 198; June, 479; July, 369; August, 105; September, 130; October, 175; November, 80.

Messrs. Bennett Bros'. Crop of Federation—Yield 50½ Bushels Per Acre.

A Heavy Crop of Major Wheat at Messrs. Pogue & Sons, Arcadia.

Messrs. Bennett Bros. crop of Austan and Joffre wheats was grown on a red flat which was winter-fallowed in September. It was harrowed in October and spring-toothed in November. In the autumn the paddock was harrowed in May, scarified in early June, harrowed in mid-June, and drilled. From 72 to 74 lbs. of seed per acre was used, with 124 lbs. superphosphate. Two strokes of the harrows were given after the drill. The remaining entry of these competitors was Major. It had been seriously thinned out by an attack of flag smut. Based on a count made on the spot, damage to the extent of 33 per cent. was estimated.

Mr. T. Mellerick's crop was Penny wheat. It was somewhat thin, and showed signs of having been attacked by flag smut. The fallow upon which it was grown was well-worked, but apparently too finely for the season. The seed was comparatively pure. Seventy lbs. of seed with 70 lbs. of superphosphate per acre were drilled in. The paddock has been cropped every second year for a number of years.

Mr. T. Roe's crop of Federation was somewhat patchy in appearance. Heavy rains had fallen immediately after the crop was sown. The paddock was well worked, and seeded during the third week in May with Federation wheat at the rate of 55 lbs. per acre, with 95 lbs. superphosphate. The Federation was comparatively pure and free from weeds.

The heaviest portion of Messrs. Pogue and Sons' crop of Major was on a portion of the paddock not submitted by them to the judge last year. Mr. A. R. Vincent's crop of Major had been badly waterlogged, as had that of Mr. W. Ross. Mr. H. Kerr's entry was unfortunately sown dry on a paddock infested with rubbish, consequently the yield, though satisfactory, was not so heavy as it should have been.

Highest Aggregate for 50 Acres of Fallow Judged 1922. Crop on the Fallow 1923.

Details of Award.

Name.	Variety.	Yield.	Purity.	Weeds.	Disease.	Evenness.	Total for Crop 1923.	Total for Fallow, 1922.	Grand Total.
Possible Points ..	.. .. ..	**35**	**20**	**15**	**15**	**15**	**100**	**100**	**200**
Bennett Bros. (No. 1)	Federation and Wannon	35	17	12	14	12	90	95	185
Bennett Bros. (No. 3)	Austan and Joffre	26	19	13	14	14	86	90	176
T. Mellerick ..	Penny ..	23	19	12	13	11	78	93	171
T. Roe	Federation ..	21	19	14	13	10	77	89	166
Bennett Bros. (No. 2)	Major ..	19	18	14	7	13	71	94	165
W. A. Trewin ..	Federation ..	20	16	7	12	13	68	94	162
Pogue & Sons ..	Major ..	25	16	9	9	12	71	83	154
A. R. Vincent ..	Major ..	15	18	10	13	10	66	89	155
Wm. Ross	Major and Yandilla King	15	16	13	14	9	67	87	154
A. E. Dainton ..	Minister and Joffre	9	17	10	12	14	62	86	148
H Kerr	Major ..	21	17	3	10	9	60	82	142

Section III.—Fallow 50 Acres.

In this section competitors submitted a variety of soils, ranging from chocolate loams in the Cosgrove district to the grey loams at Congupna.

The entry of Mr. J. Knox, Cosgrove, was placed first with 95 points; Mr. J. Phillips' No. 2 entry was next with 93, then followed Mr. W. A. Trewin's No. 2 entry with 92.

The winning fallow was partly summer-fallowed and partly winter-fallowed. The summer fallow was ploughed in March to between

3 and 4 inches deep, harrowed after rain, then scarified in August shallowly, and again in September and harrowed. In October a further scarifying and harrowing was given.

Mr. Jas. Phillips' entry, on grey soil, was also summer-fallowed as follows:—Ploughed in March to 3 inches, re-ploughed in August to 4 inches, harrowed twice, then spring-toothed, spike-rolled, and finally "smoodged" with a clod crusher and leveller. This is an interesting attempt to test the value of summer-fallow on this particular soil. The season, with its phenomenally dry autumn, however, has been as favorable to conserving moisture in winter fallows as in summer fallows.

Federation Wheat at Mr. T. Davies', Undera.

Mr. W. A. Trewin's No. 2 entry was situated on similar soil to the last cited. The land was ploughed in July to 5 inches deep, then harrowed, disced-rolled, and subsequently twice spring-toothed. All the above fallows had fair moisture content below.

Section III.—Fallow 50 Acres.

Details of Award.

Name.	Soil Type.	Moisture.	Mulch.	Weeds.	Cultivation.	Total.
Possible Points ..	.. ..	**25**	**25**	**25**	**25**	**100**
J. Knox	Red loam ...	24	23	25	23	95
Jas. Phillips (No. 2)	Grey clay loam	23	23	24	23	93
W. A. Trewin (No. 2)	Grey clay loam	21	22	25	24	92
W. A. Trewin (No. 1)	Grey clay loam	20	23	25	23	91
Jas. Phillips (No. 1)	Grey clay loam	22	21	25	20	88
T. Young & Sons ..	Red loam ..	20	22	23	21	86
H. Graham ..	Red loam ..	20	23	18	21	82

Note.—There were two general classes of soil in this competition. The red is superior to the grey.

Fertilising Goulburn Valley Lands.

To test this question a series of experimental plots were laid out by the Department of Agriculture on the farm of Mr. T. Roe, Shepparton. There were ten plots, each one-third of an acre in area. All were sown with Federation wheat at the rate of 72 lbs. per acre. The plots were not sown till the first week in June. Immediately afterwards they were subjected to a continuous downpour of rain; hence they are somewhat irregular; nevertheless, the results are most informative.

The plot treated with 2 cwt. of superphosphate gave the heaviest yield—31.8 bushels per acre. This was 10.5 bushels more than was

No Manure. Superphosphate, 2 cwt.

Departmental Experimental Plots Conducted by Mr. T. Roe, Shepparton.

obtained by the use of superphosphate ½ cwt. per acre, which approximates to the dressing usual in the district. The plot left unfertilized yielded better than was expected—24.8 bushels. This was probably due to the late rains experienced when the balance of the plots had ripened, while this one remained somewhat green. In a normal year the lateness of the unmanured crop would have proved a detriment to it. An interesting feature of the results was the value of the fertilizer in encouraging a better growth of the wheat in any wet patches; the growth in these patches on the 2-cwt. plot was in striking contrast to the lightly-manured plots.

AN EXAMPLE OF LINE-BREEDING.

By J. S. McFadzen, Senior Dairy Supervisor.

Every stock-breeder who has reached a standard of consistent success over a period of years, which will cover at least four generations of the breed being handled, will be found to have worked on some definite system, which includes a sound blood relationship between the males and females used. Without such relationship the mating of even pure-bred animals of selected type will not result in sustained progress. Different strains of stock are usually marked by superior excellence in some direction, and breeders study to perpetuate such distinctive features by means of line-breeding.

Line-breeding is the mating of selected animals which have the necessary blood lines common in their pedigrees, and by this means desired characteristics are perpetuated and frequently improved. Without line-breeding, desirable features fixed in one strain may be seriously impaired, and even lost altogether through the injudicious introduction of some other line of blood which is strongly prepotent.

A successful breeder will usually be found to possess a very close knowledge of the ancestry of all his breeding stock, and thus he is enabled to mate the various animals with considerable certainty as to what features the progeny will possess. The fact that the mating together of high-class animals, which have no known common ancestry, frequently brings disappointing results is borne out in innumerable instances in connexion with all breeds of domestic stock, but line-breeding with good quality stock makes consistent progress practically a certainty.

Some breeders rely chiefly on animals which are closely related. Others may mate together only stock which appear but remotely connected in their immediate ancestry, whereas an inspection of the pedigrees of such stock will show that the best animals in it have a close relationship, and the immediate matings are concentrating old established lines. It is through this that their success results.

Because of the endless variation in individual animals, stock-breeding cannot be conducted under any definite rule. The successful breeder usually becomes so through some natural faculty which enables him to make wise choice of his breeding animals, although he may not be able to give reasons for so chosing any of them. Somehow, he knows that certain animals have the conformation essential to improvement, and he uses them, whereas others would see no such traits in them.

There are hundreds of people raising stock of various breeds, but very few indeed who make a real success of the work. Where evidence is forthcoming that success is being achieved, it is well to bring under notice the methods employed, as it may possibly guide others, and in these instances there will invariably be found evidence of line-breeding; in some cases the animals used may even be so closely related that their mating may be classed as in-breeding.

There is a definite reason for in-breeding in many cases. A breeder may discover that he is in possession of an animal of exceptional merit, showing quality which must have been latent in one or both of its parents. To mate that exceptional animal with one of any other

line of blood is taking much risk of reducing, or even eliminating the desired quality, while to mate it back to its parent offers every prospect of fixing the newly-found excellence.

This can, however, only be done where the stock are sound constitutionally. Physical soundness, like any other quality, is improved by close breeding between strong parents, and, conversely, a physical weakness would be accentuated. Clean, sanitary surroundings have much to do with the health of stud stock, and clean grazing, pure water, and reasonable shelter from inclement weather conditions are each and all necessary to successful stud work. Also, good management does not mean over-feeding or close housing, neither being conducive to prolonged vitality.

Inquiry is frequently made as to whether there is any actual difference between line-breeding and in-breeding, and, if so, what is it? The systems are actually so closely allied as to be almost inseparable. In-breeding might possibly be defined as the mating of parents and their direct progeny, or progeny of the same parents with each other; while a system of mating which deals only with stock more distantly related may be regarded as line-breeding. Yet line-breeding cannot be carried very far before the blood relationship becomes intensified to an extent which closely approximates that obtained by in-breeding; so the difference, if any, is of no practical account. Provided the stock are constitutionally sound, blood relationship between parents is of distinct advantage in bringing about improvement, whether the system be termed line-breeding or in-breeding.

A good example in Australian stock breeding of long continued success is furnished by the Ayrshire cattle of Messrs. McNab Bros., of the Oakbank stud, at Tullamarine. The success in the show-ring of this firm runs back to over forty years ago, when there were several studs which had equal chance with the Oakbank, for in all of them were cattle bred on similar lines; but McNab Bros. out-distanced all in consistently breeding high quality Ayrshires.

Throughout the whole history of the Oakbank stud there have been many champion show-ring animals bred by the owners, and stud animals purchased from there for use in other herds have shown remarkable prepotency consequent on their high quality having been fixed by a definite system of line-breeding.

A fair example of the breeding system which made this Oakbank strain of Ayrshires prepotent in the transmission of their type excellence may be seen in the pedigree of Bellbird of Oakbank (5504), the dam of the bull Bell Boy of Oakbank (3545), now in the stud of Mr. A. H. Schier, of Kernot. Although but four years old Bell Boy has won many show-ring prizes. Bellbird's dam, Bloom of Oakbank (2665) was a most useful stud matron, having produced seven heifers in nine years, one of them being Bright of Oakbank (5516), the champion Ayrshire cow of the 1920 Melbourne Royal Show.

Bellbird's pedigree is given herewith in extended form. It supplies a most complete illustration of line-breeding, and is also an excellent example of what is known as a first class pedigree, consequent on so many of the animals mentioned therein being prominent prize winners, while several of the bulls have been progenitors of very superior producing cattle under the Government herd test.

Glen Elgins Bruce 129
Bruce II (bred in New Zealand)
Annie Laurie 2nd of Oakbank
21st Duke of Barbiston 26 by Duke of Randwick 28 (IMP)
Annie Laurie of Oakbank 8
Southern Chief 81 (bred in New Zealand)
Annie Laurie 7
Rarity 307
Gordon 38
Adas Earl of Oakbank I by Duke of Randwick 28 (IMP)
Jean 168 by Earl Percy
Rosamond 326
Adas Earl of Oakbank I by Duke of Randwick 28 (IMP)
Rosalie 324
21st Duke of Barbiston 26 by Duke of Randwick 28 (IMP)
Rosie of Oakbank 322 by Southern Chief 81.
Bruce 12 times
Cerasant 13
BELLBIRD of OAKBANK 5504
Dam of Bell Boy of Oakbank 3345 owned by Mr. A. H. Scherer, Kerrisdale
Linguist of Oakbank 1763
Bloom of Oakbank 2865
Bullion of Oakbank 721
Lady of Oakbank
Regent of Oakbank 728
Bud of Oakbank 38
Regent of Oakbank 728
Bud of Oakbank 38
Renown of Oakbank 600
Lady Bird
Alpha of Oakbank 565
Rarity 2nd of Oakbank
Achilles of Oakbank 235
Blonde of Oakbank 608
Alpha of Oakbank 565
Rarity 2nd of Oakbank
Royal Prince 368
Lady Minnie
Rarity 2nd of Oakbank 235
Achilles of Oakbank 608
Blonde of Oakbank 565
Alpha of Oakbank 565
Rarity 2nd of Oakbank
Royal Prince 368
Lady Minnie
Rarity Bull 355
Alice of Oakbank 406
Glen Elgins Bruce 129
Rarity 307
Alpha of Oakbank 565
Rarity 2nd of Oakbank 235
Achilles of Oakbank 608
Blonde of Oakbank 565
Alpha of Oakbank 565
Rarity 2nd of Oakbank
Royal Prince 368
Lady Minnie
Rarity Bull 355
Alice of Oakbank 406
Glen Elgins Bruce 129
Rarity 307
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Rarity Bull of Oakbank 355
Alice of Oakbank 406
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Rarity Bull of Oakbank 355
Alice of Oakbank 406
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
Glen Elgins Bruce 129
Rarity 307
Anne Laurie of Oakbank 8
Jessie 58
May Flower 3rd 504
Peter Simple 145
Lady Snowdrop
by Bruce II
by Gordon 38
by Bruce II
by Gordon 38
by Bruce II
by Gordon 38

This pedigree, as it stands, shows the now famous Oakbank bulls Gordon (38) and Bruce (11) to have been used repeatedly, for between them they are behind 22 of the 32 animals in the fifth generation. This is in itself a concentration of the blood of these two bulls, but a few generations further back the imported bull Duke of Randwick (28) appears in the pedigrees of Glen Elgin's Bruce (129), Peter Simple (145), Belle Blandon, Alice (406), and three times in that of Rarity (307). In Bellbird's pedigree there are twelve crosses of Glen Elgin's Bruce (129), six of Rarity (307), five of Alice (406), one of Peter Simple (145), and two of Belle Brandon, the outcome of which is that Bellbird is thus line-bred to the imported bull Duke of Randwick no less than 38 times.

Bullion's sire, Linguist, was a full brother of Bloom, the dam of Bellbird, for Regent was the sire, and Bud the dam of both. Lady of Oakbank, the dam of Linguist, was a daughter of Renown, a full brother to Regent, and Lady of Oakbank was mated with Regent's son Bullion. Blonde, the dam of Bud, was by Glen Elgin's Bruce from his own daughter, Boronia, while 21st Duke of Barbiston was the sire of the dam of Glen Elgin's Bruce, and sire of Boronia's dam, Belle Blandon. When behind all these closer relationships lies the 38 crosses of Duke of Randwick 28 (imp.), the question of what is the difference between line-breeding and in-breeding is a point which is exceedingly hard to define.

Right through the pedigree of Bellbird will be found many animals which have won champion show-ring honours, and there is evidence that they were also of high dairy quality. Jamie, of Oakbank (184), whose name appears in the fourth generation of Bellbird's pedigree, was five times champion of the Melbourne Royal Show, and his son, Luminous of Oakbank (456), also a champion bull, is the sire of 14 certificated daughters which, in the Victorian Government test, averaged 8,052 lbs. of milk of 4.24 per cent. test, and 344.38 lbs. of butter-fat in 273 days under ordinary dairy farm conditions. The champion Ayrshire bull of 1923, at the Melbourne Show, was Scottish Hero of Gowrie Park (2207), whose pedigree shows nine crosses of Gordon (38), and four crosses of Bruce (11). The champion cow at this same show was Clarice of Gowrie Park (6134), with seven crosses of Gordon and four of Bruce, and Gowrie Park cattle hold the top herd test records of the breed in Australia for milk and butter-fat production. At the 1922 Melbourne Royal Show, Poppy of Ben Kell (4584) was the champion Ayrshire, and she also won the type and utility competition with a yield of 10,243 lbs. of milk and 481.16 lbs. of butter-fat in 273 days, on an average test of 4.70 per cent. In Poppy's pedigree we find the Oakbank cattle Regent, Bud, Bullion, Alpha, Achilles, Alice, Blonde, &c., as well as another bull, Majestic (326), which has four crosses of Glen Elgin's Bruce in his pedigree. He has sired good producing cows, and, amongst other sons, the bull Leo of Gleneira, with many good milking daughters in the Medburn Grove stud.

From the study of these pedigrees much will be learned as to how the combination of even show type and good dairy quality of the top grade in Victorian Ayrshire cattle has been attained.

OIDIUM OF THE VINE.

Uncinula Spiralis (Berkley & Cooke).

By François de Castella, Government Viticulturist, and C. C. Brittlebank, Vegetable Pathologist.

Continued from Vol. XXI., p. 745.

Sulphur Distributors.

Sulphur may be applied to the vine in various ways; it may even be thrown on by hand, but this is a very inefficient method, being most laborious, disagreeable, and wasteful, "something like 90 per cent. or more of the sulphur is wasted, because most of it goes on the ground, and of that which goes on the vine, a few leaves usually receive the bulk."*

Shaking from a small bag of hessian or some similar fabric, capable of holding five or six pounds of sulphur, though much more effectual, is nevertheless a primitive method, more suitable for the suburban garden, but sometimes practised in the vineyard, particularly in an emergency.

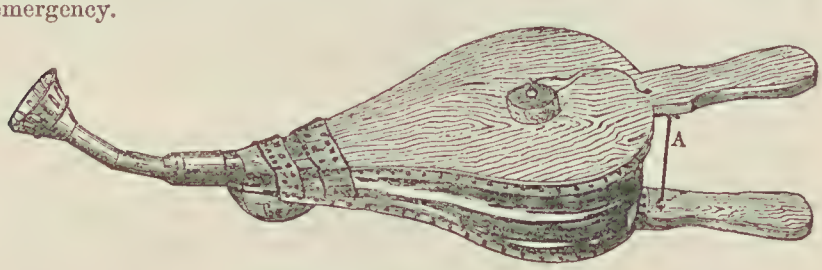

Fig. 1.—Ordinary Sulphur Bellows.
The nozzle can be adjusted at various angles. Some makes have a short straight nozzle.

Though capable of good results on low-trained vines, especially in early growth, it is wasteful of sulphur and of time owing to frequent filling of the bags; it is also very severe on the workmen's eyes (see December *Journal*, p. 740). It is most inconvenient for vines on high trellises, nor does it permit to distribute the sulphur in the interior of the vine, and even distribution to all green parts is essential to efficiency.

Various types of tin-can distributors have been devised. They are on the "pepper pot" principle with perforated tops, and present the same disadvantages as the hessian bag. Some are provided with tufts of wool or hair between the perforations to regularize the output of sulphur. In one make the top is made of sheep skin, punched with small holes, and with the wool outside.

The sulphur bellows has, until fairly recently, been the standard distributor, ever since its invention by Gontier in 1850. Though constituting a great advance, in that the sulphur can be better distributed and even forced into the interior of the vine, the bellows is tiring to operate, and as it holds but little sulphur, frequent fillings waste much

* Bioletti. *Ibid.*, p. 333.

time. It is true this can be reduced by the workman carrying a supply of sulphur in a small sling-sack provided with a bottle neck closed with a cork, like an ordinary water-bag, from which the bellows can be replenished (Fig. 2).

Numerous more or less complex bellows have been devised from time to time; these have partitions and various appliances to regulate the sulphur "feed." (Figs. 3 and 4.) Though some of these have been extensively used they have not displaced the plain sulphur bellows (Fig. 1), which is built on similar lines to the ordinary fireside bellows, but with a wider and shorter nozzle, sometimes bent on one side, and without valve; on the upper side is an opening, closed by a cork, through which the sulphur is introduced. As the bellows is operated, the air is first sucked in and then expelled, carrying with it the sulphur which was stirred up by its entry, in the shape of a light cloud, the chief fault of which is its irregularity. Sometimes a puff of the bellows expels too much and sometimes too little sulphur.

Fig. 2.—Sulphur-bag carried by Workmen to Replenish Bellows Expeditiously.

Hand-driven fan sulphurers of various types were introduced at different times in Europe and America. Into the continuous blast set up by a rotary fan, sulphur is fed from a container. These little machines were cumbersome, fatiguing, wasteful of sulphur, and prone to get out of order. None of them became really popular or a serious rival to the bellows, which remained the standard distributor. It is curious that these unsuccessful appliances were, on a small scale, almost exactly similar to the traction sulphurers described below, which are altogether satisfactory.

Vermorel's "Torpille" and Modern Dusters and Dust Sprayers.

Vermorel's knapsack sulphurer, known as the "Torpille," which was first put on the French market about 1893, was certainly the most notable advance in sulphur distribution since the invention of the bellows, 45 years earlier. Numerous other makes of "dusters" and

"dust sprayers" have appeared since, both in Europe and America, working on similar lines, but not superior to the original pioneer make. Vermorel's "Torpille" (Fig. 5) is now so well know the world over as to render detailed description unnecessary. The movable top, attached to the main sulphur receptacle by a short leather sleeve, is raised and lowered by the handle so as to act as a bellows. The sulphur is fed into the air blast through a piece of wire gauze against which works a small brush. The reservoir, holding enough sulphur to treat a couple of acres, time is not lost in refilling, as with bellows. According to M. A. Magen,* in an early report on this machine, one elderly man with the "Torpille" was able in two and a half days to sulphur a vineyard which had in previous years taken ten working

Fig. 3.—Malbec's Bellows with Special Sulphur Container.

Fig. 4.—Section of Sulphur Container of Malbec's Container.

days, the sulphur being applied by women with bellows, as was customary in the district, and the work was less well done. It is also much less wasteful of sulphur.

"The sulphur is blown out in a fine impalpable powder, and owing to the form of the machine it can be applied to any part of the vine. By standing a little distance from the vine a single puff can be made to distribute the sulphur over the whole exterior of the vine. Then, after poking the end of the tube into the centre of the vine another puff will thoroughly sulphur the interior. By a small attachment placed on the end of the tube the cloud may be forced upwards and the underside of the leaves more thoroughly treated, but this is seldom necessary. The work is much less laborious than with any of the other methods tried, and the workman is less liable to be troubled by the sulphur getting into his eyes."†

The Torpille is, in fact, an ideal distributor. The thin dust cloud it can project to quite a distance, is evenly and sufficiently charged with sulphur, thanks to a very efficient regulating device. It is thus very different to the short puffs from the bellows with their erratic charge of sulphur, which is often driven out so thickly as to place visible patches on the leaves, all such being, of course, so much waste of material. To again quote the same author‡—

"On a properly sulphured vine the distribution is so perfect that on close examination we are unable to find a square inch of surface free from sulphur

* *Revue de Viticulture*, 3rd August, 1895.
† Bioletti. *Ibid.*, p. 336.
‡ Bioletti. *Ibid.*, p. 332.

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grains. On the other hand, if on looking at a vine from a distance of 20 feet we can see any signs of the sulphur applied, more than enough has been used.

If the distribution is defective, we not only fail to free all parts of the vine from the oidium, but we leave enough of the fungus to spread rapidly through the vineyard as soon as the sulphur has been removed by rain or wind. Two or three incomplete sulphurings which fail to reach a number of whole vines or parts of vines are often less effective than one treatment which leaves no part of any vine untouched."

It is in connexion with these more efficient machines that the advantage of high-grade sulphur, in very fine powder, becomes most pronounced. With these it is really necessary to use good sulphur. In the case of the lavish application of less perfect distributors it matters little if quite a considerable proportion of the sulphur is useless.

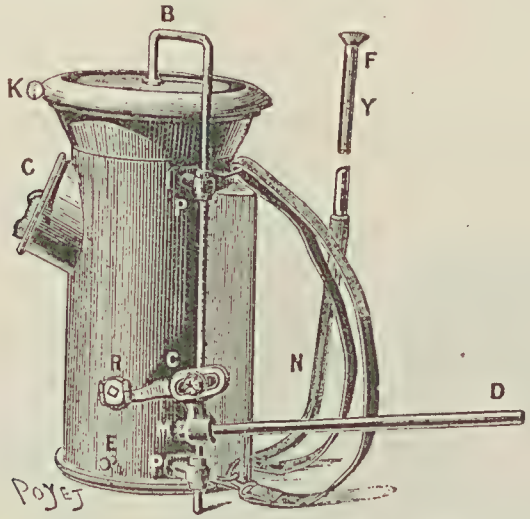

Fig. 5.—Vermorel's well-known "Torpille" Knapsack Sulphurer.

TRACTION SULPHURERS.

Sulphuring, like spraying, needs to be applied within a very short space of time; it cannot be spread over a long period like ploughing or pruning. The opportune moment is often limited to a single day, on which the whole vineyard should be treated. In order to render this possible traction sulphurers drawn by a horse have been devised, capable of treating 20 acres and over per day. Several machines of this type are obtainable in France, one of which is shown in Fig. 6. In most of these machines the air blast is induced by a wheel-driven fan; into it the sulphur is progressively fed; two adjustable nozzles distribute the sulphur cloud so as to thoroughly treat two rows of vines at a time. A Victorian machine on similar lines is also obtainable.

These machines embody most of the advantages of the knapsack dust sprayers. The thin dust cloud is of similar nature to that from the Torpille, described above, the main difference being that it is continuous; it envelops the whole of the vines in each row so that no part can escape its quota of sulphur, nor is this deposited anywhere in excessive quantity so as to be wasted. These machines are efficient

and economical, and of the greatest value in large vineyards. As with the Torpille, it is essential to use sulphur of good quality, which settles slowly and adheres well.

Quantity of Sulphur per Acre.

This naturally varies considerably according to circumstances, the factors of most importance being the number of vines per acre and their development, the stage of growth the vines have reached, the state of division of the sulphur, the type of distributor used, and the skill of the operatives.

For the close-planted vines of France, Viala gives the following estimate:—With ground sulphur, first sulphuring 13½ lbs. per acre on an average, at blossom 45 lbs. per acre, and shortly before ripening 54 to 63 lbs. per acre. With flowers of sulphur these quantities would be, respectively, 13½ lbs., 27 lbs., and 36 lbs.

Fig. 6.—Fabre's Traction Sulphurer.
The fan is wheel driven and the nozzles are adjustable.

The following table, taken from Professor Bioletti's bulletin is of particular interest in view of the similarity of Californian conditions to our own.

Estimate of Cost of Sulphuring 500 Mature Vines (1 acre).

Method.	1st Sulphuring.	2nd Sulphuring.	3rd Sulphuring.	Total.	Total Cost.
	lbs.	lbs.	lbs.		$
European machine, Vermorel's	5.0	7.5	10.0	22.5	1.16
Hand bellows	7.0	13.0	20.0	40.0	1.40
Perforated can	7.0	30.0	50.0	87.0	2.34

The sulphurs employed were of good quality, costing $2 and $2.50 per 100 lbs., and labour was paid at the rate of $2 per day.

Other Methods of Applying Sulphur.

Two other methods of utilizing sulphur for oidium control may here be mentioned, though they have not yet received the sanction of practical experience.

Burning Sulphur among the Vines; Fumigation.

The following extract from the *Murray Pioneer,* of 28th January, 1921, describes the method:—

"This season certain Renmark vineyards have been regularly fumigated with sulphur. Instead of being dusted over the vines, or blown on to them, the sulphur has been burned at night-time between the vine rows; and it is claimed that a very large measure of immunity against black spot, as well as against oidium, has been obtained in this manner. . . . Mr. Percy Wyatt . . . states that a very good *primâ facie* case has been made out for the practice. The fumigated vineyards, he says, are certainly freer from disease than others in the same neighbourhood.

Reference to the horse-drawn device used by Mr. C. Gregory for distributing sulphur fumes through his vineyard was made in the *Pioneer* some time ago, but it appears that the practice of sulphur fumigation was instituted by Mr. C. Cramp, who has been treating his vineyard in this fashion for at least three years. Little heaps of sulphur on paper are placed down every fourth vine row, the heaps being about 40 feet apart each way, and they are ignited *during the night* (the italics are ours). . . . It is reasonable to assume that fumes so created would be at least as effective against oidium as those arising from the application of sulphur in the ordinary way. . . . But in the presence of sunlight the fumes from burning sulphur have a markedly injurious effect on vegetation; and the knowledge of this has doubtless prevented attempts to substitute the burning of sulphur in the vineyard for the accepted practice of dusting the vines with it. In the dark, however, the sulphur fumes have not the same virulent action on the leaves, and however Mr. Cramp 'tumbled' to this fact, he has made good use of it. . . . . A still night should be chosen for the fumigating fires."

The success claimed for the new treatment would seem to confirm the theory, now discredited, that sulphur owes its efficacy to its oxidation to sulphur dioxide (SO_2). It is more probable that SO_2 is toxic to the oidium mycelium in the same way as the emanations given off by sulphur applied in the usual way, whatever these emanations may really be.

The past few seasons have not been very favorable to the spread of oidium, nor for comparative tests of the efficacy of fumigation without which the real value of the new method cannot be gauged. It is nevertheless interesting and worthy of mention.*

Sulphur Applied by Means of a Steam Jet.

In *Progrès Agricole,* of 7th May, 1922, appears a letter summarily describing a new sulphuring appliance which the writer (M. B.) had seen at the international fair held at Francfort, a few days previously—

"A firm from the Grand Duchy of Baden showed a special generator intended to spray at will; sulphur, carbon bisulphide, nicotine, turpentine, naphthaline, formol, kerosene, &c., permitting their utilization in the form of very dense and penetrating 'vapours' projected by means of a steam jet. The apparatus, which is suitable both for vignerons and gardeners, is composed

* It is interesting to note that a somewhat similar treatment for Downy Mildew was recommended by Dr. Felix Chavernac in *Progrès Agricole* of 31st December, 1911, under the name of "Sulfuration." Good results were claimed from the combustion of handfuls of sulphur in the vineyard at a distance of 30 ft. x 30 ft. This was burnt before sunrise, the season being midsummer. An editorial footnote advises caution, and mentions the poor results obtained from a similar method, by Dr. Vidal, in 1885. It also warns of the danger of scalding the foliage. Since Dr. Chavernac's article no further mention of Sulfuration seems to have appeared in France.

of a cylindrical copper boiler, containing water heated by a spirit lamp. The sulphur is introduced by a manchon (sleeve) on the side traversed by the exit steam pipe. The apparatus, which only weighs 4 kilos (9 lbs.) is held in the hand, hanging from a handle. Sulphuring is done automatically as soon as the steam tap is turned on. The quantity of sulphur used is insignificant; 1 kilo per hectare of vineyard (about 1 lb. per acre), and the sulphuring of the hectare takes only an hour . . .

Fusion of sulphur (112 deg. to 117 deg. C.) is a method of extracting sulphur from the ore containing it, by means of steam at a temperature of 140 deg. to 150 deg. C.

The apparatus, rapidly described above, projects steam containing small particles of sulphur. This 'cloud' can rise (according to the maker) to a height of 25 metres and spread for 100 metres.

But does not this sulphur, suddenly cooled, pass into the amorphous form? The vapour 'carrying' the sulphur can reach all parts of the plants, including the underside of the leaves. This form of spraying has also the advantage of being possible in rain or high wind. . . ."

This "atomizing" of the sulphur by means of superheated steam seems quite feasible. It should result in the sulphur reaching the vine in an exceedingly fine state of division. Further information concerning this method would be at least interesting.

Ploughing of Sulphur into the Soil.

This is a recommendation which crops up periodically, and is soundly believed in by a few growers. The beneficial effects on oidium, if any, are certainly not due to absorption of the sulphur by the roots of the plant as some seem to think. It is evident that applied in sufficient quantity and often enough, the surface layers of the vineyard could be so charged with sulphur that emanations fatal to oidium would be produced on a hot day, also the dust resulting from the working of scarifiers, &c., in such soil would be equivalent to a much diluted sulphuring. Nevertheless it is a clumsy and wasteful way of applying sulphur and infinitely less effective than ordinary sulphuring.

Liquid Sprays.

When atmospheric conditions are such as to favour its proper functioning, no treatment is superior to sulphuring; it is an ideal method. The main condition is that the weather be warm enough to permit the sulphur to send out the emanations necessary for the destruction of the oidium fungus. It thus sometimes happens in cool showery weather that the results obtained from sulphuring prove disappointing.

Sulphur does not act under 77 deg. to 86 deg. F. In showery weather much of the sulphur is washed off the vine, so that repeated application becomes necessary. It is true that oidium likewise requires warmth. Bad attacks are rare in cool weather. Nevertheless, it may happen that the weather is too cool for sulphur to act properly, and yet quite warm enough for oidium to do a good deal of damage.

Under such conditions, which are rare in this State, it may be more satisfactory to apply the sulphur in the form of a spray. Adherence is better; in other words, the spray is not immediately washed off by rain, but has a certain duration of action, and the soluble fungicide most of these sprays contain, has an immediate effect on the fungus mycelium with which it comes in contact.

Sprays containing sulphur or other substances may thus be quite useful for the control of oidium under certain circumstances. It is true, however, that no sprays do the work as thoroughly as sulphur. "A spray only kills the fungus which it actually touches, and the most perfect spraying possible will leave some parts of the vine untouched. Where a spray is used it should therefore be followed by an application of dry sulphur to complete the work."*

Sulphur may be applied by means of the spray pump in the following forms:—Polysulphide of potash or liver of sulphur, lime sulphur, sulphur incorporated with other spray mixtures such as Bordeaux or copper soda, and a spray mixture made up with very finely-divided sulphur, in suspension in water.

Potassium Polysulphide or Liver of Sulphur.

This spray is largely used in France for oidium control early in the season, when, as often happens in some French districts, the weather is too cool for sulphur to prove efficient. For later treatment sulphur is generally preferred.

These sprays act in two ways. The sulphide solution is in itself poisonous to the fungus mycelium which it touches; in addition, part of it is gradually decomposed to set free sulphur in a very fine state of division. It follows that spraying with polysulphide solution is to a certain extent equivalent to a sulphuring. The sulphur thus deposited has the advantage of adhering well to the vine surface, but the quantity liberated in this way is naturally small.

Capus† points out that the use of this substance for the control of oidium is not a novelty, since it was recommended by Bouchardat in 1853, or shortly after the first appearance of the disease. It was subsequently recommended by Dufour (of Lausanne, Switzerland), and by Chappaz, who found it superior to sulphur in northern districts in a cool season, since "sulphur is really only active against oidium at temperatures of over 77 deg. to 86 deg. F."

He describes experiments conducted near Bordeaux with 500 grammes liver of sulphur and 500 grammes black soap, per hectolitre of water (1 lb. liver and 1 lb. soap to 20 gallons of water). In one experiment two sprayings at this strength were equivalent to three sulphurings, whilst in another the two sprayings were as effectual as two sulphurings. The polysulphide also proved effectual against Eudemis,‡ but when applied at twice the above strength (1 per cent.) severe scalding of leaves and fruit occurred.

From these experiments he concludes that though alkaline polysulphide or liver of sulphur constitutes a remedy for oidium, sulphur will always be preferred by practical men for the following reasons:—(1) Sulphur is always ready for use, whereas polysulphide must first be dissolved. (2) Sulphur being a powder, it can be more easily distributed, and it penetrates better among the organs of the vine to be protected than a liquid spray, especially in summer, when the bunches are hidden by foliage. (3) The use of polysulphide is very severe on copper spray pumps; these must be thoroughly washed after use.

In a general way sulphur will always be preferred to polysulphide for oidium control. If it be used, it should be for early applications only, which are executed before blossom. At this period it presents the following advantages:—(1) The young bunches, not yet hidden by the leaves, can be reached by the spray. (2) At this time of year the temperature necessary

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* Bioletti. *Ibid.*, p. 346.

† *Revue de Viticulture*, 20th June, 1918.

‡ Eudemis, Cochilis, and Pyrale are three tortrix caterpillars which are responsible for an enormous amount of damage in French vineyards. Seeing that they are rather closely related to our Australian light-brown apple moth (Cacœcia), the danger of this last becoming a disastrous pest in Australia seems very real.

in order that sulphur may be active does not always prevail. (3) Oidium invasion has not yet started; treatment at this moment is really preventive; sulphur, being a powder, remains but a short time on the leaves, and its duration of action is limited. (4) Polysulphide could be used at the same time as *sulfatage** (spraying with copper fungicides such as Bordeaux, &c.).

Dr. Trabut† (Algeria) reports very good results with a self-boiled alkaline polysulphide of sodium (not of potassium) prepared as follows:—

Place in a bucket 5 lbs. of sulphur and 3¼ ozs. of finely powdered rosin. Add enough water to make a paste, and after having thoroughly mixed the lot, add to this thick paste 3 lbs. 5½ ozs. caustic soda and stir well. After a few minutes the reaction commences, the mass boils, all the sulphur is dissolved, combining to form a reddish-brown liquid which is made up with water to 1 gallon. For use, dilute this solution, 1 part to 100 with water.

Dr. Trabut points out the great saving in sulphur this mixture renders possible. His article, written before the end of the war, was mainly with the object of showing how the short supplies of sulphur then available to vine-growers could be made to go further.

Lime Sulphur.

This being practically polysulphide of calcium must act in a very similar manner to potassium polysulphide. Dr. Trabut, in the article quoted above, states that it may be substituted for the potash salt. He mentions self-boiled lime sulphur as an excellent alternative to soda polysulphide.

Lime sulphur is so well known to our orchardists that further description of it here is superfluous; the summer strength usually applied by apple-growers for black spot control, 1 to 50 of a good commercial brand should be sufficient against oidium.

Mixing Sulphur with Bordeaux, etc.

It often happens that oidium and Downy Mildew need to be simultaneously combated. Seeing that copper sprays are of as little value against the former as sulphur is against the latter, it becomes expedient to combine the two, thus making one spray application serve the dual purpose. Chemical action between the two being insignificant, there is no objection to their being mixed together. The incorporation of sulphur in Bordeaux mixture or copper soda is, however, by no means an easy matter. The sulphur is not wetted by the liquid, but floats on the surface, which becomes covered with innumerable small air bubbles coated with the fine sulphur powder. Any one who has tried to mix sulphur with water in the ordinary way knows the hopeless task it seems to be. "Wettable" sulphurs, capable of easy incorporation, are obtainable in Europe. These may be prepared in various ways. Oleic acid dissolved in methylated spirit (10 per cent. solution) mixed with sulphur at the rate of 1 quart of the solution to a cwt. of sulphur is one method. On the evaporation of the alcohol the sulphur remains wettable, and can be readily stirred into water or

* This last point is open to question. The admixture of polysulphide or of lime sulphur to Bordeaux results in radical transformations in both constituents. In some quarters this addition is held to be highly undesirable.

† *Progrès Agricole*, 7th April, 1919.

spray mixture. Another method is to knead 7 lbs. of sulphur into a smooth creamy paste in 1 gallon of water in which is dissolved half-an-ounce of glue.

The simplest way of incorporating the sulphur in the spray mixture is, however, to first mix it with the casein solution, so advantageously used as a "spreader" with alkaline "Bordeaux." Half-a-gallon of the usual casein stock solution* is placed in an ordinary large wash-hand-basin, preferably diluted with an equal bulk of water, 10 lbs. of sulphur is progressively tipped into the basin in several different lots and thoroughly incorporated in the casein solution by means of a mechanical egg-beater of the usual household type. As the beater is rotated, the sulphur floating on the surface of the casein solution is rapidly sucked under to form a smooth cream, which, after being passed through a very fine meshed sieve, is stirred into the contents of the spray pump.

Only sulphur of first class quality (exceedingly fine state of division) is suitable for the purpose, and even with such, a pump with an efficient stirring appliance is necessary to keep the sulphur in suspension. Unless the sulphur be very fine the nozzles and pipes leading to them soon clog.

The quantity of sulphur to use is generally stated to be 10 to 14 lbs. to 50 gallons of spray mixture. Obviously the finer the sulphur the less will be required. With precipitated sulphur, which is exceedingly fine, the quantity could be considerably reduced—5 or 6 lbs. should, in fact, suffice. This class of sulphur, as well as those forms known commercially as atomic or atomized sulphur, is particularly well suited for use in combination with other sprays.

The precipitated sulphur may also be merely mixed with water, with casein as a spreader and to increase adherence: 5 or 6 lbs. to 50 gallons of water, with half-a-gallon of casein stock solution, would make a good spray.

Permanganate of Potash Treatment.

This treatment of oidium was first recommended by Ch. Truchot in 1899. Permanganate of potash in weak solution in water is very deadly to the mycelium of oidium which is easily reached by such a spray owing to its epiphytic nature. Permanganate is thus a valuable spray for oidium control, especially in seasons unfavorable for the action of sulphur, and also in grave outbreaks when much of the vine surface is coated with the fungus. Every portion of the mycelium touched by the spray is almost immediately destroyed. Unfortunately the action of the permanganate is of very short duration; it is itself decomposed shortly after it comes in contact with the vine tissues. Hence it needs to be always followed by an ordinary sulphuring which completes it, and effectually deals with any reinfection resulting from portions of the oidium fungus missed by the spray.

F. P. contributed an article to *La Revue de Viticulture*, of 17th June, 1915, the following extracts from which may prove of interest:—

"When sulphur proves insufficient, recourse must be had to supplementary treatments with potassium permanganate. We know large vineyards where important areas were violently attacked each year—low-lying parts constituting

* Made at the rate of water ½ gallon, caustic soda ½ oz., and casein 5 ozs. This quantity is sufficient for 50 gallons of spray.

constant foci of invasion, where weekly sulphuring only gave insignificant results. Complementary treatment with potash permanganate has checked the disease and saved the crop.

The efficacy of permanganate is not recognised by all growers. . . Failures are due to faulty application. . . . The mixing of permanganate with other sprays, or even with 'wettable' sulphur, is a bad method, the salt being decomposed by such admixture.

Potassium permanganate must be employed alone, dissolved in water. As soon as it touches mycelium or spores they are burnt and destroyed; every drop which touches oidium kills it and reduces it to dust (when dry); but on the fruit the drops do not penetrate between the berries of tight bunches. Though most of the fungus is killed, the spots untouched re-sow the disease.

Therefore, as soon as the weather is fine and dry, the permanganate must be followed by sulphur, the vapours of which complete the curative work. The combination of the two treatments is necessary. In vines most severely attacked, two sprayings with permanganate, followed by sulphuring as soon as the weather is fine, permit the checking and certain control of the parasite. Solutions of permanganate before blossom should be at the rate of 150 grammes per hectolitre (1½ lbs. per 100 gallons) of water; after the fruit has set the dose may be increased to 200 grammes (2 lbs. per 100 gallons); even though dear at present, the cost is really not high in view of the positive result obtainable against virulent oidium invasion."

Permanganate treatment is also of special value for the protection of certain vines which do not tolerate sulphur, such as Othello and other direct producers, which would be quite defoliated if treated in the ordinary way.

Permanganate may also be applied in the shape of compound powders. The following formulæ are given by Professor Degrully,* of Montpellier:—

No. 1 Powder.

Slaked lime or plaster	..	85	parts by weight
Potassium permanganate	..	15	„ „
		100	

This should be very finely powdered and applied in early morning when the dew is on the vines.

No. 2 Powder.

Precipitated sulphur	..	85	parts by weight
Potassium permanganate	..	15	„ „
		100	

Seeing the very fine state of division of precipitated sulphur, it would seem reasonable to reduce its proportion by about one-half, replacing it by a lime or an inert substance such as plaster, as is done to some extent in—

No. 3 Powder.

Flowers of sulphur	..	65	parts by weight
Slaked lime or plaster	..	20	„ „
Potassium permanganate	..	15	„ „
		100	

Powders are also made up which contain 10 per cent of copper sulphate for use against Oidium and Downy Mildew simultaneously, as described in this *Journal* for December last.

* *Progrès Agricole*, 6th July, 1913.

A SHEEP DIP PLATFORM OR "TIP."

By A. W. Curlewis, Inspector of Stock.

On his property, near Alexandra, Mr. Peter Kelly has constructed a "tip" or platform at his sheep dip, and I am indebted to him for many of the following particulars regarding the construction.

The dip is situated on the side of a hill; water may therefore be conveniently syphoned out of a dam above and carried by a 2-in. pipe into a 200-gallon tank placed near the dip. As the ground drops sharply, the liquid contents of the bath may be easily drained. This is done by means of an outlet pipe fixed near the bottom of the bath on the lower side and closed from outside by a screw tap or plug.

The dimensions of the bath are—Length, 7 ft. 6 in.; width at top 3 feet, at bottom 2 feet; depth 5 ft. 6 in. It is not advisable in a sheep dip in which a platform is used that the bottom should be less than 2 feet in width; if narrower sheep would be liable to jamb in it. The walls and floor are of brick grouted in cement mortar (1 in 6) and faced or rendered with cement mortar (1 in 2). As the dip was built in an excavation, partly blasted out of solid rock, there were several irregular spaces at the back and sides which had to be filled. The filling consisted of a composition of gravel 6 parts and cement 1 part. A slide door operates at the end of the bath proper to admit the sheep after being dipped to the ramp or "walk out."

The ramp is made of similar materials to those used for the bath. Its dimensions are—Length, 13 feet; width, 1 ft. 9 in.; depth at back, 5 feet, sloping up to the surface.

The draining yard is divided into two sections each 8 feet by 18 feet. At the bath end of the dividing fence a gate is swung so as to allow the sections being used alternately. In the floor of the yard, which is made in the same way as that of the bath, there is a slope or fall to the centre of 1 inch and a slope from the back towards the bath of 9 inches.

A shallow gutter runs across the end of the "get out" or ramp to convey liquid to a well or settling pit situated 3 feet down along the side of ramp. This well is 2 ft. 2 in. square, and the liquid returns from it to the bath through a space left in the edge of the ramp by leaving out a brick; over this opening aperture there is placed a strainer made of pieces of 10-in. gauge wire inserted into a small wooden frame. These wires are spaced three-eighths of an inch apart and prevent pieces of dung, wool, &c., from returning to the bath. The strainer is cleaned every now and then and the well skimmed frequently.

The yards approaching the dip are mostly V-shaped with a slight curve. "Blocks" across are placed at intervals of two or three panels. The yards lead to a wide curving race to the left of the bath. This race is 20 feet long and the width narrows from 6 feet to 3 feet. A length of 9 feet of the floor at the narrow end is covered with a hardwood grating placed some 12 inches from the ground; this allows dirt to fall through.

From the yards the sheep pass on to the "tip," which is really a platform built on a strong timber foundation. Split posts 2 ft. 9 in.

long are sunk 2 feet in the ground, and on these are fixed hardwood bearers 4 in. x 3 in. Four of the posts are about 3 feet outside the line of race and platform and are fixed to the back of the platform. The platform is 7 ft. 1 in. long by 2 ft. 10 in. wide and is built of sawn hardwood. The main bearer or axle consists of a piece of 4 in. x 3 in. hardwood 7 ft. 9 in. long, each end of which has been rounded off to permit it to work in a socket formed in each of the two posts before referred to. Two pieces of 2 in. x 3 in. hardwood 7 ft. 1 in. long form the other bearers; four cross-pieces are bolted to the axle and nailed to the bearers and to these are nailed the 6 in. x 1 in. boards that make the floor.

The position of the axle is not in the centre of the platform, but about 1 ft. 9 in. from the front or "lip" of tip, so that a balance towards the bath may be created when the platform is loaded with sheep. The back of the platform is formed of four pieces of hardwood, the bottom ends of which are mortised into the cross-pieces of the floor, and the top ends into a piece of 2 in. x 3 in. hardwood; to these ½-in. hardwood boards are nailed. Three of the uprights are 2 in. x 3 in. hardwood 4 feet long, except the end piece which is 4 in. x 2 in. and 4 ft. 6 in. long. The top of this piece projects 6 inches and is mortised to carry a wooden wedge or "key" run through it and into a mortise in the corner post of race and also into a piece of 3 in. x 1 in. hardwood fixed on corner to keep it plumb. By this means the platform is held in a horizontal position until it is released by withdrawing the "key." A pull on the back of the "tip" will slide the sheep gently into the bath; this operation can be performed by the man "feeding" sheep on to the platform. Five average-sized sheep may be dipped in this way at one time.

Mr. Kelly assures me that, if care be exercised, there need be no fear of injury to the sheep. A wooden "blind" or screen is swung on to prevent the sheep seeing the bath whilst they are being forced on to the platform and to hold them in position on same until it is released. The screen is 7 feet long, 3 feet high, and consists of a 3 in. x 3 in. and 3 in. x 1 in. hardwood frame to the long pieces of which ½-in. boards are nailed vertically. The ends of the piece of 3 in. x 3 in. which form the top of the screen are rounded and inserted into posts at each end so that the screen may swing when pushed by the sheep.

Two pieces of 4 in. x ½ in. metal plate, bent to right angles, with the ends turned down so as to minimize the chances of hurting the sheep are screwed to and underneath the floor of platform a few inches from edge at each corner; these serve to keep the screen firmly in position until the tip is released. The floor of the platform when in horizontal position projects 9 inches beyond and about 6 inches above the edge of bath thus allowing the end to just reach the edge when tipped.

On the opposite side of the bath a light plank is fixed to project 6 inches over the edge, and to this is hinged another light board of softwood which may be used when the bath is quite full to check the splash as the sheep slide in; later this device may be turned back underfoot.

A decoy pen to hold three or four sheep is constructed on the far side of the platform, opposite entrance thereto (the sheep run into it across the platform), and there is also a larger decoy pen at the side of last panel of the race leading to platform and a gate opening from race through which sheep can be run into it.

Mr. Kelly kindly supplied me with the following details of approximate cost of material, &c., at the time the dip was constructed some years ago. Most of the items would probably cost more now.

	£	s.	d.
Bricks (about 1,000)	3	10	0
Cement, 3 casks at £1	3	0	0
H.W., 700 feet at 14s.	4	18	0
Labour (say)	30	0	0
	41	5	0

On the 9th January last, I saw some 700 sheep being dipped from the platform at Mr. Kelly's farm, and there was no hitch of any sort. Since it was first constructed thousands of sheep belonging to farmers in the surrounding district have been dipped from this platform, and there has never been any complaint of injury to a sheep, nor of ineffective dipping.

For dealing with small and moderate-sized flocks such a platform as that described seems to be just what is required.

FEEDING SHEEP.

By A. J. Gill, Dairy Supervisor.

FATTENING ON CRUSHED OATS AND CHAFF.

In this Journal for September last the results were given of an experiment made by Mr. H. L. Webb, of Sunbury, in fattening sheep by hand-feeding.

On the conclusion of the first experiment Mr. Webb carried out a second one with some weaners—the remaining portion of the flock from which the best had been selected for the previous trial. In order to get a fair average, 11 were chosen of different sizes and weight, and were ear-marked and raddled, so that each could be identified according to number. These, with 39 others, making 50 in all, were turned into an 18-acre paddock on two-thirds of which there was a growth of lucerne 3 or 4 inches long. The sheep, however, refused to touch the lucerne, preferring the cut-leaf geranium which was growing profusely between the rows

Owing to their having been moved from hill country to a flat paddock, the flock refused to settle down, and consequently for the first week lost condition. After this, however, they became contented in the new surroundings and gained in weight steadily. The food used was crushed oats, lucerne and oaten hay chaff. During the fifth week, whole oats were substituted for crushed oats for five days, with the result that the average gain was lower than usual; one weaner actually lost half a lb. in weight.

During a few days of the fourth week pure lucerne chaff was fed instead of the mixed chaff, but the sheep commenced to scour; therefore the mixture was again given them. Whenever the allowance of

chaff was increased beyond half a lb. per sheep daily, the trough was not cleaned out.

The weaners were prime in six weeks, but Mr. Webb decided to keep them a week longer. During this time they did not clean up their feed and the gain was lower than usual.

The following table shows the food given and the average loss or gain for each period The first weighing took place on 23rd June:—

Week.	No. of days in Test.	Daily feed allowed per sheep in addition to grazing.	Average loss or gain.
			lbs.
First ..	7	½ lb. crushed oats and ½ lb. oaten hay chaff ..	−2.33
Second ..	7	¾ lb. crushed oats and ¼ lb. mixed lucerne and oaten hay chaff	+5.11
Third ..	7	1 lb. crushed oats and ½ lb. mixed chaff ..	+3.95
Fourth ..	7	1 lb. crushed oats and ½ lb. mixed chaff ..	+4.226
Fifth ..	7	1 lb. whole oats for five days, then crushed oats as usual for the remaining two days, and ½ lb. mixed chaff daily	+2.636
Sixth ..	9	1 lb. crushed oats and ½ lb. mixed chaff ..	+6.59*
Seventh ..	7	1 lb. crushed oats and ½ lb. mixed chaff ..	+2.545

* During the period of nine days one sheep gained 8¼ lbs. in weight—almost 1 lb. per day.

The greatest gain for the 7 weeks was 27 lbs.
The lowest ,, ,, ,, ,, ,, ,, 21½ lbs.
The average ,, ,, ,, ,, ,, ,, 24½ lbs.

The total cost of fattening was estimated thus—

	£.	d.
43.75 lbs. oats at 3s. 5d. per bushel	3	9
24.5 lbs. chaff at £5 10s. per ton	1	2
Grazing, 3d. per head per week	1	9
Total cost	6	8
Gain in weight 24½ lbs. at 6d. per lb.	12	3

The results of this test have confirmed those of the first, although during the period of the second experiment the weather was cold and stormy; the sheep had no high ground for a dry camp, and further, they were commencing to shed their first teeth. The oats used were second-rate—some of similar quality realizing only 3s. 5d. a bushel on the Melbourne market.

FEEDING ON SILAGE.

During drought years thousands of valuable sheep and lambs are allowed to die of starvation although ½ lb. of crushed oats and a little chaff per day would save each sheep, and 1 lb. of crushed oats and some chaff daily would fatten them. In most districts where sheep can be grazed oats can be grown, and 40 lbs. of crushed oats with 20 lbs. of chaff would fatten most sheep in five weeks, if there is any pasture available.

Mr. Baillieu, of the Torumbarry Estate, Echuca, has realized that it is profitable to hand-feed sheep, and regards the storage of feed as an absolute necessity if sheep-farming is to be made remunerative to the highest degree. Each year he makes a quantity of oaten silage, and last autumn when sheep-owners were suffering heavy losses he was able to carry his lambs through the drought period safely. The method adopted is to feed silage and oaten hay on alternate days. From 4 to 5 lbs. of silage per day is allowed each wet sheep and 3 lbs. to dry sheep; 1 lb. of hay per head is also given.

This year 200 tons of oaten crop has been turned into silage at a very low cost. A hole 75 feet long, 15 feet wide, 7 feet deep was made with the plough and scoop. This was filled up with green oats. The waggons and horses were driven backwards and forwards after each load to press the deposit thoroughly. This was continued until the stack was about 9 feet above the ground level. The earth was then scooped back over the greenstuff. Mr. Baillieu finds this method the most inexpensive, and has always had good results.

Another point of interest in connexion with the Torumbarry Estate is the conservation of water. Noticing how the floods from the Murray River every winter filled a long chain of water holes and hollows, making quite a lake for a few days and draining off as the river receded, Mr. Baillieu determined to make use of the overflow. A survey was made and at the spot selected a concrete wall about 60 feet long, flanked by earthen walls for about 40 feet on each side, was made —automatic gun metal valves were placed in the wall which open to allow the flood waters to enter but close when the Murray commences to fall. In this way about 1,500 acre-feet of water is held, and last drought period Mr. Baillieu had abundance of water stored for his stock, and was able to supply his less fortunate neighbours. An irrigation scheme is being carried out on the estate, and soon a large area will be put under lucerne which will be used for the sheep and stud cattle. Mr. Baillieu's example of storing flood water for use in dry seasons should be followed by many others along the Murray.

CHICKEN POX.

By W. C. Rugg, Chief Poultry Expert.

Chicken pox is one of the greatest causes of loss and trouble to the poultryman in Victoria. Last year a great number of outbreaks came under the notice of the Department.

The disease has the general symptoms of roup, but is distinguished from it by the eruption of pox nodules on the head and by the presence in the mouth, throat, and eyes of tough, cheesy patches, which are firmly attached to the tissues beneath them. The eruptions appear in round and irregular-shaped nodules varying in size from a pin's head to a pea, principally on the beak and on the nostrils, also on the comb wattles and ear-lobes. Owing to the number of nodules and the extension of inflammation, large patches of skin become thickened and covered with hard, dry crusts, closing the nasal openings and eyelids, and making it difficult for the bird to open its beak, or to see. Very

often the inflammation extends from the nostrils, and penetrates to the air tubes and lungs.

Some fowls in a flock are resistant, and if attacked by the disease, will, after a few days' illness, rapidly recover; others remain weak and thin in flesh, and may have more or less catarrh.

As the disease is highly contagious, the houses, feed troughs, and drinking vessels should be kept disinfected during an outbreak, and for at least a fortnight after.

In America, chicken pox vaccine is used for the prevention of the disease, but reports vary as to its effectiveness. In some cases it appears to prevent or lessen the severity of the outbreaks, while in others no benefit seems to be derived from its use. Last autumn the vaccine treatment was tried on one flock in Victoria. One hundred birds were inoculated; 95 of them were turned into a flock of 500, but no outbreak occurred. The other five inoculated hens were penned in a small coop with a hen that was badly affected with the disease; she was almost blind in one eye, and there were numerous eruptions all over her head, comb, and wattles. The coop these birds were kept in was purposely not cleaned out for six weeks; they all drank out of the same water vessel and fed from the same food trough. Not only did the inoculated birds fail to contract the disease, but the hen that was suffering from it recovered, although she received no treatment whatever. It is intended to make further trials with the vaccine this autumn.

Experience gained at the State Research Farm, Werribee, indicates that outbreaks of chicken pox can be greatly lessened, if not prevented, by taking a few simple precautions.

Flocks at the Research Farm are given regular doses of Epsom salts and sulphur in their mash from January to April. The houses are frequently cleaned and sprayed with a good disinfectant. Since taking these precautions in 1920, chicken pox has not appeared there. Roosts and nest-boxes are regularly examined for mites, as it is quite possible that biting insects, such as mites, spread infection by inoculation from sick to healthy birds. At Werribee, roosts, &c., are painted with kerosene; tar oil is used at Burnley; both are effective remedies. Houses are sprayed with chloride of lime—4 to 6 ozs. to the gallon of water. When giving Epsom salts it is best to dissolve the salts in the liquor in which the mash is to be mixed, thereby getting an even distribution. When using sulphur, it is thoroughly mixed with the bran before wetting. The amount used at the Research Farm is 1 lb. of Epsom salts to every 300 birds. The custom is to give this dose on Monday morning; 1½ lbs. of sulphur to every 300 birds is given on Thursday morning.

If chicken pox appears amongst a flock, all birds showing signs of the disease should be isolated. Salts and sulphur should be given in the manner suggested above, but at the rate of 1 lb. of each to every 100 birds. The sores should be washed in water made claret colour with permanganate of potash, and, when they are thoroughly dry, painted with iodine.

If poultrymen will adopt this treatment, combined with strict cleanliness, and feed to their birds liberal quantities of green stuff for the next three months, they will be saved a great amount of worry and inconvenience, and a considerable loss of eggs will be avoided.

BREEDING PIGS FOR PORK AND BACON.

Value of a First Cross.

It is a commonly held view that, in the production of pork or bacon, it is a sound commercial proposition to use a first cross. The reasons advanced are twofold: (1) a suitable first cross gives an ideal side of the bacon, and (2) the first cross matures more quickly and costs less to feed.

An experiment on commercial lines carried out at the Lord Wandsworth Institution at Long Sutton, Hampshire, during the winter of 1921 is of interest in this connexion, since the results of the trial indicate that a first cross does mature more quickly and is more economical to feed. Unfortunately the data available do not extend to the slaughter stage, considerations of a purely commercial nature, such as selection for breeding and marketing facilities, precluding the comparison of the data beyond the fourth month of feeding.

In the trial, nine pure bred Large Black pigs were compared with nine Berkshire--Large Black crosses. At the commencement of the trial, 13th October, 1921, the pigs were eight weeks old. The pigs in both lots received identical treatment throughout, both with regard to feeding and management, and the results obtained may be safely attributed to the difference due to the first cross.

For the first two months both lots of pigs received the same quantity of food, but as the cross-breds thrived much better, it was found necessary to feed them a little more generously in the latter stages of the trial. In both cases the pigs were given as much meal as they would eagerly clear up at each meal. The exact particulars as to meals fed are as follows:—

Pure Breds.

1st 28 *days.* Consumed 218½ lb. toppings, 105¾ lb. barley meal, 105¾ lb. maize germ meal = 430 lb. mixed meals, and 112 lb. skim milk.

2nd 28 *days.* Consumed 181½ lb. toppings, 237¼ lb. barley meal, 237¼ lb. maize germ meal, 89 lb. palm kernel meal = 745 lb. mixed meals, plus 112 lb. skim milk.

3rd 28 *days.* Consumed 1,024 lb. of meal consisting of 357½ lb. palm kernel, 309⅜ lb. maize germ, and 357⅛ lb. barley meal, together with 112 lb. skim milk and 112 lb. green kale.

In 29 *days.* Consumed 1,220 lb. of meal consisting of equal parts of palm kernel, maize germ and barley meal, together with 4 lb. of kale, 73 lb. mangolds, and 120 lb. skim milk.

Cross Breds.

1st 28 *days.* Consumed 218½ lb. toppings, 105¾ lb. barley meal, 105¾ lb. maize germ meal = 430 lb. mixed meal, plus 112 lb. separated milk.

2nd 28 *days.* Consumed 181½ lb. toppings, 240¼ lb. barley meal, 240¼ lb. maize germ meal, 92 lb. palm kernel meal = 754 lb. meal, plus 112 lb. skim milk.

3rd 28 *days.* Consumed 1,139 lb. of meal consisting of 399⅜ lb. palm kernel, 399⅜ lb. barley meal, 339⅜ lb. maize germ meal, together with 112 lb. of skim milk and 112 lb. kale.

In 29 *days.* Consumed 1,444 lb. of meal consisting of equal parts of palm kernel, maize germ and barley meal, together with 4 lb. of green kale, 73 lb. mangolds, and 120 lb. skim milk.

The weights of the pigs were as follows:—

Pure Breds.		*Cross Breds.*	
age.	lb.	*age.*	lb.
8 weeks (Beginning of trial) ...	232	8 weeks (Beginning of trial) ...	271
End of 1st 28 days	408	End of 1st 28 days	451
„ „ 2nd 28 days	655	„ „ 2nd 28 days	718
„ „ 3rd 28 days	964	„ „ 3rd 28 days	1,083
„ „ final 29 days	1,279	„ „ final 29 days	1,502

The nine pure bred pigs gained 1,047 lb. during the trial, and consumed 3,419 lb. of mixed meals plus 456 lb. of skim milk, 116 lb. of green kale, and 73 lb. of mangolds=approximately 3,503 lb. of food reckoned as mixed meals.

The nine cross-bred pigs gained 1,231 lb. during the trial, and consumed 3,767 lb. of mixed meals plus 456 lb. of skim milk, 116 lb. of green kale, and 73 lb. of mangolds=approximately 3,851 lb. of food reckoned as mixed meals.

From the above data it will be seen that the cross-breds matured more quickly. For each pound of live weight increase put on by the pure breds 3.3 lb. of meal were required, whereas the cross-breds required only 3.1 lb. of meal for every pound of live weight increase.

These results indicate that, where circumstances allow, the *first cross* between two pedigree pigs is desirable if used for commercial purposes. It must, however, be clearly borne in mind that these remarks apply only to the *first cross,* and do not apply to all cross-breds, *i.e.,* cross-breds resulting from second or third crosses, or what can be regarded as a mongrel type of pig.

—[From *Journal of the Ministry of Agriculture,* England.]

THE VALUE OF BIRDS TO MAN.

Our Australian birds are both beautiful and useful. They are the greatest national asset which our country possesses—a fact which is unfortunately only too often overlooked. Birds and animals are here for our enjoyment and use, but we are apt to forget that we hold them in trust, and should consider them an everlasting heritage to be handed down to future generations. If some people persist in destroying them, as they do now, there will come a day when our fauna will be doomed to destruction. Then our folly will rebound with terrific force, having such terrible results as may end in universal disaster. From the point of view of agriculture, we must realize that it is impossible to carry on for any time without the help of birds. Let producers of every order protect and encourage them. They are their true friends and allies.—J. R. Kinghorn, Zoologist, Australian Museum, in the *Agricultural Gazette of New South Wales,* January, 1924.

STALLION REGISTER 1923-24,

under the "Horse Breeding Act 1919."

(Part III.—Registrations prior to 8th November, 1923.)

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1445	Abbot's Pride ..	A	Draught ..	A. V. Baulch ..	Orford
1478	Abbotsford ..	A	,, ..	McGregor Bros.	Rochester
1455	,, Champion	A	,, ..	C. Elphick ..	Foster
1491	Ace of Spades ..	A	Light ..	C. Lippiatt ..	Scotsburn
1528	Admiral Moray ..	A	Draught ..	T. J. Keogh ..	Jarklin
1229	,, Sperry ..	6	,, ..	D. Mathieson ..	Waitchie
1495	Albert Dale ..	5	,, ..	Vaughan Bros. ..	524 Collins-street, Melbourne
1434	Almost	A	Light ..	D. Lang ..	Tungamah
1526	Alredo	3	,, ..	E. Cleary ..	Goorambat
1436	Ambition II. ..	A	Thoroughbred	W. Moloney ..	Mooroopna
1362	Ardmore	3	Draught ..	J. B. Howe ..	"Memsie," Bridgewater
1339	Arion Voyage ..	3	Light ..	C. Phylan ..	Balranald, N.S.W.
1503	Athlete	6	Pony ..	J. Lane ..	Club Hotel, Warragul
1470	Banjo	5	,, ..	R. Jukes ..	Maryborough
1517	Baron Alexander ..	A	Draught ..	A. F. Russell ..	Barunah Plains, Hesse
1484	,, Boy ..	2	,, ..	McCrabb Bros. ..	Wunghnu
1321	,, Crawford ..	5	,, ..	L. J. King ..	Quambatook
1386	,, Douglas ..	6	,, ..	J. Petrie ..	St. Arnaud N.
1326	,, Laddie ..	A	,, ..	A. McLennan ..	Derrinal
1441	,, Lee ..	A	,, ..	Meer Khan ..	Modewarre
1485	,, Mac ..	2	,, ..	McCrabb Bros. ..	Wunghnu
1270	,, Prince ..	4	,, ..	J. J. Quinn ..	Elmore
1341	,, Style ..	4	,, ..	J. H. Kelly ..	Purnim
1271	Baron's Pride ..	5	,, ..	J. J. Quinn ..	Elmore
1219	,, ,, ..	A	,, ..	H. Scarse ..	Melton
1501	Battarlons ..	A	Light ..	T. Skelley, jun. ..	St. Arnaud
1366	Beau Cheval ..	A	,, ..	P. J. Minogue ..	Saulty Creek
1435	Belmain	A	Draught ..	D. Lang ..	Tungamah
1322	,, Belmont ..	4	,, ..	J. L. King ..	Quambatook
1350	Belmont	3	,, ..	J. T. Poynton ..	Ensay South
1413	Best Vale	A	Light ..	E. H. Guppy ..	Goomalibee L.B.
1383	Bill Style	3	,, ..	W. Barry ..	Heathcote
1475	Billy	A	,, ..	G. Petersen ..	North Preston
1357	,, ...	A	Pony ..	G. Howlett ..	220 Bell-street, Coburg
1203	,, Mac	A	Light ..	W. Calaby ..	Ararat
1301	Birdette	4	Pony ..	T. W. Francis ..	Woodside
1324	Black Diamond ..	4	Draught ..	H. Neutha ..	Rockbank P.O.
1309	,, Huon ..	A	Light ..	J. Sandwith ..	95 Scott's-pde., Ballarat East
1224	,, Knight ..	5	,, ..	G. and W. Lord ..	Flynn
1450	Blacon	A	Draught ..	J. Phillips ..	Marcus Hill
1248	Blue Bolt	5	Pony ..	A. Philip ..	Nerrin Nerrin
1228	Bold Prince ..	5	Draught ..	G. Ross ..	Mt. Prospect
1292	Bonnie Baron ..	4	,, ..	R. N. Scott ..	Kongwak
1328	,, Knight ..	4	,, ..	Gerrard Bros. ..	Mangalore West

Stallion Register, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1213	Bonnie Signal ..	A	Draught ..	J. R. Crilly ..	Carag Carag P.O.
1217	Bonny Mac ..	3	,, ..	J. Brown ..	Stawell
1443	Border Prince ..	3	,, ..	J. Power ..	Rochester
1533	Bramhope Parthian	A	,, ..	C. L. Renfrey ..	Drysdale
1363	Breeze	A	Light ..	T. Ryan ..	Tatura
1454	Bright Bells ..	A	,, ..	S. R. Ritchie ..	Thomastown
1349	Calmont	4	,, ..	H. Scarse ..	Panton Hill
1405	Cannonite ..	A	Pony ..	J. G. C. Graves ..	Mt. Battery, Mansfield
1543	Captain Llewellyn ..	A	Light ..	H. Bullock ..	Hamilton
1539	Carbinet	A	,, ..	W. Falls ..	Fish Creek
1285	Cascadian ..	5	Draught ..	A. Colvin ..	Nathalia
1227	Castledale ..	2	,, ..	J. B. Ferguson ..	Waubra
1423	Cedric Hero ..	5	,, ..	Hardetta Singh ..	Pier Millan P.O.
1387	Cedric's Son ..	A	,, ..	S. Barber ..	Glenalvon, Birchip
1444	Centredale ..	3	,, ..	J. Opie ..	Werribee
1476	Clan Newton ..	A	,, ..	Bailey Bros. ..	Bundarra, Glenrowan
1425	Claymore's Pride ..	2	Pony ..	E. Bromley ..	Tungamah
1290	Cleve Todd ..	5	Light ..	T. A Hardwick ..	Queen-street, N. Essendon
1375	,, Voyage ..	3	,, ..	J. Gleeson ..	7 Somerset-st., Richmond
1518	Colonel Young ..	A	Draught ..	W. H. Twigg ..	Janiember
1406	Come More ..	A	Pony ..	J. McDonald ..	Orbost
1240	Comet	2	Draught ..	W. Henderson ..	Grassmere
1251	Commodore III. ..	5	Pony ..	E. C. Weir ..	Newry
1242	Cornet	3	,, ..	Wm. Coxon ..	Nangella
1403	Count Traquair ..	A	Thoroughbred	T. D. Ryan ..	Tatura
1294	Craigmond ..	4	Draught ..	A. Kay .	Binginwarri, *viâ* Welshpool
1299	Creeper	A	Pony ..	F. A. Brow ..	Rosedale
1448	Creswick Wood ..	2	Draught ..	G. H. Winnett ..	Reedy Flat, Ensay
1493	Crighton's Tim ..	5	Pony ..	S. A. Greaves ..	Berwick
1511	Cronje Wilkes ..	A	Light ..	G. B. Mackie ..	Camperdown
1345	Cross in Hand Charmer	A	Draught ..	F. Deery ..	Bengeworden
1402	Cutty Sark ..	A	Pony ..	L. Dureau ..	Woodford
1293	Cymbrel	5	Light ..	S. Hancock ..	Poowong
1407	Cyndette II. ..	5	Pony ..	C. G. Newton ..	Kilmany South
1352	Cyndetto	4	,, ..	R. Costello ..	Giffard P.O., Darriman, *viâ* Sale
1367	Dan Bells	A	Light ..	H. G. Gregerson	Benalla
1206	Dandy Again ..	A	Pony ..	A. Polack ..	Katyil
1315	,, Geordie ..	6	,, ..	T. G. McKenzie	Yarram
1404	,, Premier ..	5	Draught ..	R. W. Zirkler ..	Kerang
1527	,, Style ..	A	Pony ..	S. R. Lobb ..	Nagambie
1542	Defender	A	Draught ..	J. Ballantyne ..	Buln Buln
1381	Derby Osterley ..	A	Light ..	G. D. Trekardo ..	214 Ascot-st., Ballarat
1390	Digit Alto ..	A	,, ..	E. Cuthbert ..	Terang-road, Camperdown
1384	Dixie Wood ..	5	,, ..	F. W. Shillito ..	Yendon

Stallion Register, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1385	Doctor Jack ..	A	Light ..	H. Coleman ..	Wingallock, *viâ* St. Arnaud
1429	Donald of Balmoral	3	Draught ..	R. N. Sutherland	Nullawil
1415	Duke	A	,, ..	E. A. Thornley ..	Kangalong, Hawkesdale
1310	Dunmore's Pride ..	4	,, ..	J. Doherty ..	Bungaree
1261	Dunure Blend ..	5	Draught ..	Hehr Bros. ..	Woolert
1319	Dux Picture ..	6	Light ..	H. A. Kent ..	41 Greig-street South Melbourne
1430	Earl Derby ..	A	,, ..	E. Barrett ..	c/o J. Campbell, Echuca
1311	Eltham	A	,, ..	B. Shanahan ..	Thornton Grange, St. Arnaud P.O.
1268	Emulator Junior ..	A	Pony ..	J. G. Scott ..	Hopetoun
1254	Erigator	A	Draught ..	R. Whinfield ..	Bamawm
1291	Ethelred of Bolobek	4	,, ..	R. Watson ..	Digger's Rest
1273	Everard Bute ..	4	,, ..	J. G. Bail ..	Kyabram
1226	Everlasting Dale ..	2	,, ..	Murray Bros. ..	"Harberton," Glenlyon
1204	Expectation ..	A	Light ..	W. P. Lawlor ..	Coldstream
1535	Fatty Arbuckle ..	A	Draught ..	Jas. Mills ..	Warracknabeal
1298	Federal Prince ..	A	,, ..	G. M. Vallence ..	Cohuna
1468	Flashdale	4	,, ..	W. M. Black ..	c/o W. H. S. Campbell, Cooring, Coldstream
1234	Flash Dillon ..	A	Light ..	P. W. Shelton ..	Mordialloc
1401	,, Newton ..	A	Draught ..	J. Price ..	Mologa
1360	Flashwood ..	6	Light ..	R. Elvis ..	Kooweinga-boora
1278	Foreman	5	Draught ..	E. Morton ..	Drouin
1512	Freedom	A	Light ..	W. Robertson ..	Goorambat
1250	Galtee	3	Thoroughbred	T. Walsh ..	Seaton-road, Glenmaggie
1489	Gay Garland ..	A	Draught ..	F. McCrae ..	St. Alban
1340	General McDonald ..	A	,, ..	C. Simons ..	c/o D. F. Gibson, Wedderburn
1457	,, R.	6	Light ..	L. Welch ..	Gopsted
1502	Ginger	A	,, ..	D. McLean ..	Chiltern
1202	Giru	A	Thoroughbred	Brig.-Gen. W. J. Clark	Sunbury
1414	Glad Bells	A	Light ..	S. Dowker ..	Shepparton
1521	Glengarnock ..	A	Draught ..	B. McKenzie ..	Bass P.O.
1452	Glengarry ..	A	Pony ..	W. L. Stewart ..	Newbridge
1353	Glynne Loch ..	A	Light ..	R. Costello ..	Gifford P.O., Darriman
1411	Golden Locke ..	A	Pony ..	E. F. B. Wood ..	Colac West
1479	Governor Bracey ..	A	,, ..	F. T. Vause ..	Lyons, *viâ* Heywood
1218	Granite	4	Thoroughbred	W. Charles ..	Maldon
1373	Great Voyage ..	4	Light ..	H. E. Leftley ..	17 Union-street, Brighton
1483	Gwalia Caesar ..	A	Pony ..	E. McKoy ..	Wodonga

Stallion Register, 1923–24—*continued.*

Art. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1289	Hampton's Lad ..	3	Draught ..	J. McGuinness ..	Leongatha
1327	Happy Bells ..	A	Light ..	W. H. Bell ..	Bowser, *viâ* Wangaratta
1398	Harold Pronto ..	4	,, ..	Dr. G. Connolly	London Bank Chambers, Creek-street, Brisbane, Q.
1546	,, Wilkes ..	A	,, ..	Mrs. Shipp ..	73 Laity-street, Richmond
1465	Harry Rose ..	A	,, ..	A. G. Hunter ..	Burrewang Park, Elmore
1365	,, Siam ..	2	,, ..	J. J. Power ..	Rochester
1258	Harvest Again ..	A	,, ..	J. Clark ..	Ouyen
1241	Hemsdale	2	Draught ..	G. Francis ..	Lower Norton Creek L.B.
1236	Herdsman's Treasure	4	,, ..	W. J. Cobbledick	Undera
1534	Hero	A	,, ..	J. T. Baker ..	Tyabb
1494	His Majesty ..	A	,, ..	T. Burt ..	Cowwarr
1314	Homeward Bound ..	4	Light ..	McCarney and Coto	Tinamba
1446	Ideal Footprint ..	A	Draught ..	F. S. Falkiner and Sons	Widgiewa, N.S.W.
1374	Ipidi	A	Thoroughbred	A. Kennedy ..	Arcadia
1538	Irak	3	Pony ..	S. Perrins ..	Nagambie
1451	Jack	A	Draught ..	W. Fanning ..	Wyuna East
1449	,, McKinney ..	A	Light ..	D. Moriarty ..	Wee-wee-rup
1348	,, Smith ..	A	Draught ..	S. Maddern, jun.	Leongatha
1235	,, Southerton ..	3	Light ..	G. A. Dunnet ..	Skipton
1409	Jimmy Lea ..	A	,, ..	W. Bradshaw, sen.	Spring Lea, Skipton
1514	Jock McCraw ..	A	Draught ..	Williamson and Coghill	Wendouree
1368	Jumbo	A	Pony ..	C. and W. Kallawk	Pomborneit
1490	Kelm Pride ..	A	Draught ..	C. Lippiatt ..	Scotsburn
1286	Kelm's Best ..	A	,, ..	J. Bright ..	Mirboo
1467	Kelso	A	,, ..	Carty Bros. ..	Nandaly
1416	Kerston	4	,, ..	N. Ramsey ..	c/o Henry Pullen, 396 Bourke-street, Melbourne
1481	Kilty	5	Light ..	H. J. Emonson ..	Suttons
1540	King Almont ..	A	Pony ..	J. Clarke ..	Mortlake
1510	,, Bronte ..	A	Light ..	C. Hando ..	Charlton
1262	,, Marvin ..	3	,, ..	J. Rousch ..	236 Nicholson-street, Footscray
1379	,, Mauritius ..	2	,, ..	W. Cattlin ..	Elmore
1212	,, Osterley A. ..	A	,, ..	G. Anderson ..	Aberdeen-street, Newtown, Geelong
1231	,, Owyhee ..	A	,, ..	W. Barkmeyer ..	Koondrook
1482	King's First ..	2	Draught ..	C. A. Jolly ..	Woomelang P.O.
1458	Kingston	A	,, ..	R. P. Nicol ..	Yarram
1477	Kintyre	A	Light ..	McGregor Bros.	Rochester
1500	Kitchener ..	A	Draught ..	Werribee Research Farm	Werribee

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1265	Larrakin	A	Light ..	H. Sutherland ..	Chinkapook
1214	Lee Creek Favourite	A	Draught ..	Ewart Bros. ..	Boundary Park, Dargalong
1361	Left Bower ..	6	Light ..	Mrs. E. Hepner ..	15 Holmes-road, East Brunswick
1347	Little Argyle ..	A	Pony ..	W. H. Lyon ..	"The Grange," Sale
1283	,, Mac ..	4	,, ..	E. C. Henry ..	"Quarry Hills," Berwick
1388	,, Welshman ..	A	,, ..	—. Hancock ..	Dunolly
1207	Llang Graeme ..	A	Thoroughbred	O'Brien and Johnston	Cowwarr
1308	Lochaber	5	Light ..	W. Cochrane and Sons	Pootilla
1369	Locksley	A	Draught ..	C. F. Schulze ..	Arkona
1336	Lord Allan ..	3	,, ..	T. W. Barnes ..	Berriwillock
1358	,, Antony ..	A	Thoroughbred	D. McMillan ..	Rainbow
1472	,, Cedric ..	3	Draught ..	J. B. Preece ..	Vite Vite
1215	,, Clarrie ..	A	Pony ..	W. Bidmade ..	Swan Marsh
1466	,, Huntly ..	A	Draught ..	Jas. Ore ..	Buninyong
1488	,, Roberts ..	A	,, ..	Mocklin, W. F. ..	Riddell Creek
1389	,, Trentham ..	A	,, ..	C. Maher ..	Tatura
1394	Lorryman ..	A	,, ..	C. Baldry ..	Cosgrove
1245	Lucknow	3	,, ..	A. Strawhorn ..	Barfold
1515	Lucky Charm ..	A	,, ..	D. Williamson ..	Wendouree P.O.
1498	,, Willie ..	2	,, ..	Mrs. J. J. Hanlon	Goomalibee, *viâ* Benalla
1497	Lymm Champion I.	A	,, ..	E. Wilson ..	Ruby Park, Leongatha
1463	McLeish	A	,, ..	P. O'Callaghan ..	Jack River
1471	Mac Rose	2	,, ..	G. W. O'Neill ..	Jack River
1461	Majestic	4	Light ..	R. Trewick ..	Elmore
1442	Major Albert ..	5	Draught ..	J. P. Doherty ..	Rochester
1433	Malacca	A	Light ..	Beattie Bros.	Tungamah
1332	Marama	3	,, ..	E. A. McRae ..	Buchan
1513	Marathon	A	Pony ..	J. G. Stewart ..	Hamilton
1211	Marcellus II. ..	3	Draught ..	J. Bunge and Sons	Sheep Hills
1263	Marcus	5	Pony ..	N. S. Lett ..	Box 11, Sale
1496	,, Junior ..	3	Light ..	Blair Bros. ..	Lara
1284	Maritimus ..	5	Draught ..	T. J. Opie ..	c/o Adamson, Strettle and Co.
1223	Mark	4	,, ..	J. Curran ..	Traralgon
1408	Master Vengeance ..	A	Light ..	W. Bradshaw, sen.	Skipton
1205	Maurite	A	,, ..	Mrs. P. Kervin ..	Cohuna
1338	Mauritius Voyage ..	3	,, ..	J. Phyland ..	Watson's-terrace, Ascot Vale
1532	Menin	A	Thoroughbred	H. A. Currie ..	Burrumbeet
1296	Merrimic	A	Light ..	G. M. Vallence ..	Cohuna
1335	Merry Lad ..	4	Draught ..	T. Sweeney ..	Boolite
1257	,, Peals ..	A	Light ..	D. McLeod ..	Tehan-street, Kyabram

Stallion Register, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1428	Mick	A	Pony ..	H. Foster ..	Red Cap, *viâ* Casterton
1399	Moorang	A	Thoroughbred	A. E. Batson ..	Somerset Stud Farm, Buckley
1239	Moredun Baron ..	3	Draught ..	J. R. Mitchell ..	Moredun Hill, Sandford
1267	Musket Bells ..	A	Light ..	J. H. Latta ..	Derrinallum
1210	Musko	A	Thoroughbred	R. F. Green ..	Bruthen
1453	My Fancy ..	6	Draught ..	R. Hetherington	c/o Young Bros., Horsham
1439	Native Prince ..	A	„ ..	R. McKenzie ..	Woodford
1247	Nipper	2	Pony ..	R. Geddes ..	Lake Bolac
1307	Nutshell	5	„ ..	A. M. Greenfield	Market Square, Ballarat
1359	Operation ..	A	Light ..	Thos. Lay, jun. ..	Tallangatta
1274	Ormond	3	Pony ..	D. Rumpf ..	Reid-street, Herne Hill
1427	Oyama	A	Light ..	A. E. Kay ..	Dean
1525	Perfection ..	A	„ ..	E. A. Boker ..	Gilleston
1426	Peter Eden ..	4	Draught ..	J. Dyer ..	Benambra
1277	Pharoah	4	Light ..	J. D. Patterson ..	Officer
1417	Pleasant Voyage ..	6	„ ..	S. J. Beavis ..	King-street, Doncaster E.
1393	Premier's Fancy ..	A	Draught ..	R. Jack ..	Rutherglen
1447	Prince	2	„ ..	P. Waide ..	Kyabram
1396	„ Alexander 2nd	A	„ ..	W. S. Booley ..	Ligar-street, Ballarat
1259	„ Denver ..	A	Light ..	H. Bambridge ..	339 St. George's road, Northcote
1370	„ William ..	A	Draught ..	A. Nicol ..	Thoona
1295	Principal	A	Light ..	J. Kosch ..	Byaduk
1456	Punter	A	Pony ..	R. Ready ..	Rutherglen
1377	Queen's First ..	A	Draught ..	J. H. Hard ..	Woomelang
1438	Quondong Stamp ..	3	„ ..	J. A. Pearce ..	Glenrowan
1275	Raeburn	4	„ ..	E. I. Fowler ..	Anakie
1216	Ranfurly	A	„ ..	Colyer, L. C. ..	Goroke
1282	Reality II. ..	3	Pony ..	W. Horswood ..	Emerald
1269	Red Cap	A	„ ..	D. C. Macdonald	Valencia Creek, Gippsland
1460	Ringmaster ..	A	Draught ..	L. Brooks ..	Ouyen
1412	Ring Up	4	Thoroughbred	W. J. McKenzie	Mirboo
1382	Ripple Pride ..	4	Draught ..	J. Nunn, jun. ..	Birchip
1531	Rizzio	A	Thoroughbred	H. A. Currie ..	Burrumbeet
1516	Rocket	A	Pony ..	R. M. Whelan ..	Apollo Bay
1281	Royal Ensign ..	4	Draught ..	A. Chirnside ..	Berwick
1342	„ Fashion ..	A	„ ..	J. Toogood ..	Hawkesdale
1400	„ Malt ..	6	Thoroughbred	E. Dunstan ..	Wando Bridge, Casterton
1317	„ Reserve ..	A	Light ..	H. Bambridge ..	254 St. George's road, Northcote
1221	„ Seal ..	4	Draught ..	J. Dugdale ..	Myrniong
1333	„ Simon ..	3	„ ..	A. E. Cox ..	Alma, near Maryborough
1506	„ Trillion ..	3	„ ..	A. Colvin ..	Nathalia

STALLION REGISTER, 1923-24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1312	Royalvina ..	4	Light ..	S. Adkins ..	Warragul
1544	Rysharold ..	A	Pony ..	A. H. Hunt ..	Lancefield
1272	Sahara	A	,, ..	E. A. Mahar ..	Kerang
1208	Salient	A	,, ..	L. J. Weatherly ..	Mortlake
1279	Scotch Laddie ..	2	Draught ..	W. J. Greaves ..	Lyndhurst
1530	,, Prince ..	2	,, ..	Evans Bros. ..	Redcamp, Moyhu
1356	,, Spirit ..	A	Thoroughbred	W. Charles ..	Maldon
1264	Scotland's Viceroy ..	A	Draught ..	Todd and Allen	Willenabrina
1537	Seabound	A	Thoroughbred	G. J. McVean ..	Thougla
1233	Seacombe ..	A	Pony ..	E. G. Gibbs ..	Sale
1432	Sea Voyage ..	6	Light ..	K. Noonan ..	Redesdale
1344	,, ,, ..	3	,, ..	F. Freudenthal ..	293 Royal-pde, Parkville
1280	Seisylt Sensation ..	4	Pony	F. Keeble ..	c/o Mrs. Drake, Upper Beaconsfield
1220	Seldom Seen ..	4	Draught ..	H. B. Lee ..	Clunes
1201	Selkirk	A	,, ..	T. T. Mulder ..	The Cherry Tree, Murroon
1462	Shandon Bells ..	A	Light ..	W. Morris ..	Ascotvale-road, Newmarket
1288	Shanter Junior ..	3	Draught ..	C. Muhleison ..	Wooreen, *vid* Leongatha
1244	Shanter's Best ..	4	,, ..	R. H. Thomson	"Prospect," Kyneton
1464	Sharpshooter ..	A	Thoroughbred	T. Cumming ..	Orbost
1331	Shetland Laddie ..	4	Pony ..	W. B. Irvine ..	Nicholson
1256	Shilinga	A	Light ..	D. McLennan ..	Derrinallum
1459	Siam's Choice ..	3	Draught ..	R. Trewick ..	Elmore
1306	Silver King ..	2	Pony ..	G. Kenworthy ..	211 Scott's-pde, Ballarat East
1487	Sir Armadale ..	4	Draught ..	J. Lincoln ..	Portarlington
1255	,, Bute	6	,, ..	Clyne Bros. ..	Tinamba
1519	,, George ..	A	Pony ..	I. K. Russell ..	Barunah Plains, Hesse
1524	,, ,, ..	A	Draught ..	E. J. Griffiths ..	Tongala
1232	,, Harold ..	6	Pony ..	Mrs. N. Rose ..	Epping
1346	,, Thomas ..	A	Draught ..	W. H. Lyon ..	The Grange, Sale
1418	,, Whyee ..	A	Light ..	W. E. Johnstone	Woodford
1410	,, William ..	A	Draught ..	W. A. McClellan	Bungaree
1505	St. Mark	A	,, ..	Ellison and Constable	Box 96, Beula
1469	Standard	A	,, ..	A. Rees ..	Nalanjie, Casterton
1266	,, ...	A	,, ..	J. G. Scott ..	Hopetoun
1305	Stylish Bells ..	5	Light ..	C. H. Kennedy ..	130 Victoria-street, Ballarat East
1249	Sugar King ..	5	Thoroughbred	D. J. Weekes ..	Stratford
1243	Sunray	4	Pony ..	W. C. Dettmann	Kyneton
1325	Superior	A	Light ..	D. Tallent ..	Underbool
1492	Swimming Belt ..	A	,, ..	W. T. Cox ..	Spring Vale Stud Farm, Moolort

STALLION REGISTER, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1304	Texas Huon ..	5	Light ..	J. Calnin ..	Alfredton P.O.
1209	The Bard	A	Draught ..	L. J. Weatherly..	Mortlake
1371	„ Design ..	A	Light ..	W. J. Carter ..	438 Barkly-street, St. Kilda
1509	„ General ..	A	„ ..	D. J. Kendall ..	303 Brunswick-road west, Brunswick
1424	„ „ ..	2	Draught ..	J. Watkins ..	Boho South
1276	„ Globe ..	3	Light ..	J. Barker ..	4 Woolercott-street, Coburg
1361	„ Joker ..	A	Pony ..	A. E. Ellery ..	Redesdale
1420	„ Leeward ..	A	Thoroughbred	J. H. G. Creighton	Yarck
1222	„ Parisian ..	4	Light ..	H. Lidgett ..	Myrniong
504	„ Scrip	A	Thoroughbred	H. McKinnis ..	Ararat
1523	This Time ..	A	Pony ..	H. Hance ..	Yannathan
1246	Tigo	4	„ ..	A. Knight ..	Lake Bolac
1419	Tinylights ..	4	„ ..	Z. L. Small ..	French Island
1440	Tom Almost ..	A	Light ..	W. Merrigan ..	Swanpool
1334	„ Thumb ..	5	Pony ..	T. McGrath ..	Irrewillipe East
1480	Tommy Burns ..	5	Draught ..	W. Cook ..	Speed
1313	Tra George ..	A	Thoroughbred	James and Wall..	Leongatha
1474	Trilight	A	Light ..	R. P. Nicol ..	Yarram
1354	Tuxedo Voyage ..	4	Pony ..	M. E. Towt ..	Garfield
1303	Udales Bride ..	3	Draught ..	C. N. Chisholm ..	Cardigan
1323	Uxbridge Fyvie ..	A	„ ..	W. Charles ..	Maldon
1376	Valice Direct ..	A	Light ..	Jno. Pretty ..	142 Booran-rd., Glenhuntly
1522	Venture	A	Pony ..	L. E. King ..	Violet Town
1473	Volunteer	A	„ ..	T. B. Waters ..	Parc-glas, Corryong
1300	Von Osterley ..	A	Light ..	R. Forrest ..	Cowes, Phillip Island
1541	Wallae	A	Thoroughbred	A. C. Mason ..	Maude-street, Shepparton
1378	Wee McGregor ..	6	Pony ..	J. T. Laidlaw ..	Chetwynd, *viâ* Casterton
1287	Welsh Sovereign ..	4	Light ..	J. Dickinson ..	South Dudley
1520	Wenba	A	Pony ..	Jno. O'Keefe ..	Green Hills, Winslow
1253	Weybridge ..	5	Thoroughbred	W. Studman ..	Lucknow
1330	Widgiewa Chief ..	4	Draught ..	S. J. Lynn ..	Orbost
1320	Wigton's Pride ..	4	„ ..	L. J. King ..	Quambatook
1302	William Direct ..	5	Light ..	S. Richards ..	Nerrina
1421	Yarraview Benmore	3	Draught ..	A. E. T. Payne ..	Lilydale
1536	Yorkie II. ..	A	Light ..	G. J. McVean ..	Thougla, Corryong
1343	Young Albyn ..	A	Draught ..	J. Watkins ..	Euroa
1372	„ Baron Bold ..	2	„ ..	S. Sandwith ..	Wallace, *viâ* Ballarat
1508	„ Croydon ..	A	„ ..	D. Blair ..	Terrappee
1392	„ Emulator ..	A	Pony ..	Skehan Bros. ..	Vollum - street, Geelong
1422	„ Flashlight ..	A	Draught ..	T. Rawson ..	Bingo, Omeo P.O.
1225	„ Lymmy Champion	4	„ ..	W. H. Penaluna	Boolarra
1237	„ Nobby ..	A	Pony ..	L. Durling ..	Powlett River

Stallion Register, 1923–24—*continued.*

Cert. No.	Name.	Age.	Class.	Owner.	Address.
		Yrs.			
1318	Young Prince Royal	A	Draught ..	W. D. Gibb ..	Moyhu
1545	„ Recruit ..	A	Pony ..	E. W. Waters ..	Echuca East
1431	„ Siam ..	2	Light ..	L. G. Hicks ..	Strathallan
1297	„ Starlight ..	2	Draught ..	A. B. Hateley ..	Mitre Lake
1395	„ Starling ..	6	Light ..	W. Regan ..	6 Montgomerie street, Moonee Ponds
1230	„ Sunbeam ..	A	Pony ..	W. H. Barkmeyer	Barham, N.S.W.
1486	„ Timekeeper ..	A	Draught ..	Conroy Bros. ..	Bolwarrah
1351	Zone Time ..	4	„ ..	Jno. Gibson ..	Benambra

ORCHARD AND GARDEN NOTES.

E. E. Pescott, F.L.S., Pomologist.

The Orchard.

Young Trees.

Young trees of the Citrus family should now be making a good, thrifty growth. The foliage should be glossy, and its general appearance a bright green and healthy one. Occasional light waterings, as well as mulching of grass, or of well-rotted manure, will be helpful to the trees.

Young deciduous fruit trees will also benefit by having a grass or manure mulch; and, if it has not previously been attended to, unnecessary growths in the centre of the tree and on the main leaders should be removed.

Fumigation.

Evergreen trees, including those of the citrus family, that are infested with scale, should now be sprayed or fumigated to rid the trees of this pest. For spraying, a weak red oil emulsion, lime and sulphur spray, or resin wash will be found useful. The most successful method, however, of dealing with the scale pest is by fumigation. The trees should be closely enveloped in an airtight sheet or tent, and hydrocyanic gas generated inside. The chemicals for generating the gas, as well as the fumes of the gas itself, are excessively dangerous, and great care is necessary in their manipulation. A wooden, enamel, or earthenware vessel is placed inside the tent, the vessel containing a mixture of 4 fluid ounces of sulphuric acid, and 12 fluid ounces of water, the acid being placed in the vessel first. Four ounces of cyanide of potassium is then quickly dropped into the vessel, the tent closed down at once, and the bottom of the tent all round covered with soil to prevent any of the gas escaping. The operator must take care that not the slightest portion of the fumes is breathed. Fumigation should be carried out at night-time or on a cloudy day, if the foliage of the trees be thoroughly dry.

The Vegetable Garden.

Celery crops will now be a prominent feature in the vegetable section. The seed may be sown from January to March, and succession plantings should be carried out occasionally during those months. The growth of celery should be quick; a fair supply of water and a good rich, loose soil are helpful to its growth.

Ample water will now be required in the vegetable garden. The surface should be kept well hoed, and mulchings of manure given wherever possible.

Cabbage, carrot, turnip, radish, lettuce, peas, cauliflower, &c., seeds may now all be sown, and young plants from any seed beds planted out.

The Flower Garden.

Constant watering and hoeing will now be required for successful gardening. Cannas will require manuring; the old flowering stem should be removed to make way for the new growths. Dahlias and chrysanthemums will need a great deal of attention, staking the growths as they develop, disbudding, thinning out weak shoots, and removing unnecessary growths. The dahlias should receive a good soaking of water during the hot weather, and liquid manure or quick acting fertilizers given when the flower buds are developing. When chrysanthemum buds are very small, liquid manure should be applied. Roses may now be summer pruned; all weak growths should be removed, and the strong ones shortened to a fairly good bud. The plants should then receive occasional waterings with liquid manure, and be kept well supplied with water.

All flowering trees and shrubs that have finished blooming should be pruned, the flowering growths removed, and, unless the seed is required, all seed heads cut off.

Cuttings of pelargoniums, zonale and regal, may now be planted, and delphinium spikes that have finished flowering cut down to make way for new growth, the plant being watered and manured. Seeds of perennial and hardy annual plants, especially winter-flowering sweet peas, Iceland poppies, stocks, and pansies, may now be sown, and a few bulbs for early flowering planted. The beds should be well manured and deeply worked in anticipation of planting the main crop of bulbs.

REMINDERS FOR MARCH.

LIVE STOCK.

Horses.—Feed as advised last month. Those in poor condition should be "fed up" in anticipation of winter.

Should horses not be feeding well and salivating, examine mouth for grass seeds. Horses running at grass are frequently affected by them. The seeds should be removed, and a mild mouth wash used. A very weak solution of Condy's Fluid will answer the purpose.

Grass seeds also cause blindness if not removed from the eye, and the inflammation reduced by bathing the eye with boracic solution. A teaspoonful of boracic acid to a pint of boiling water is the correct strength for the purpose. Should a scum remain over the eye inject into the eye every other day a small quantity of the following solution:—Sulphate of zinc, 4 grains; water, 1 pint.

Cattle.—Cows in milk should have plenty of succulent fodder and water easy of access. When cows in milk have to be fed on chaff it should be soaked with about half its bulk in water from 12 to 24 hours and the necessary concentrates mixed in at time of feeding. This soaking will soften the grain in the chaff, preventing its loss in the droppings, and is the nearest substitute for the succulence so necessary. Algerian oats should be sown on suitable land for grazing off in the winter. Sow a mixture of oats, rye, and tares or peas for winter fodder or to fill silos. Only exceptional cows and those required for town milk supply should be served between now and July. Within the next two or three months is the best time for cows to calve, as they will pay to feed through the winter and give the best returns for the season, and be dried off when the grass is dry and scarce. Calves should be given lucerne hay or crushed oats where grass is not available. It will pay well to feed crushed oats to good cows.

Pigs.—Sows about to farrow should be provided with short bedding in well ventilated sties. See that the pigs have shade, and water to wallow in. Pigs should be highly profitable now. Pollard should be used for very young pigs, and bran for suckling sows, and to help to prevent constipation.

Sheep.—All ewes should be kept strong for lambing. Crutch round tails and lessen accumulation of discharge, and consequent attraction to the fly pest at lambing time. Clear wool from round udders and teats and thereby save many a lamb in bad weather; especially is this necessary in the case of young ewes of the Merino and Lincoln crosses. Clear wool from eyes also. In crutching ewes when close to lambing lay them over carefully, grasp by the thigh low down, not by the flank as is generally done. Pure British breeds of ewes and very coarse cross-breds may still be only coming in season; rams should be left mated to make sure. Clean excessive wool and stains from ewes, and burr and stains from around the "buttons" of rams to ensure service. Shearing is done much more carelessly these times. Reserve good paddocks for ewes with early-born lambs. Where possible, castrate ram lambs immediately. Good prices promise for mutton, and particularly for lamb. There is a considerable shortage of mutton sheep throughout Australia.

Poultry.—Cull out the drones and get rid of surplus cockerels. Keep forward pullets well fed—eggs are rising in value. Repairs to houses should be done this month. Thoroughly cleanse all houses and pens. Spray ground and houses with a 5 per cent. solution of crude carbolic acid. The regular use of Epsom salts and sulphur once a week for the next three months, combined with strict cleanliness, will act as a safeguard against chicken pox; 1 oz. of salts and ½ oz. of sulphur to every twenty birds should be given in the mash—salts one day, and sulphur three days after. Burn all refuse and old feathers. Provide a liberal supply of green food. For each moulting hen, add a teapsoonful of linseed to the morning mash. Drinking water should be kept in cool shady spot.

CULTIVATION.

Farm.—Work fallow where possible for autumn sowing of cereals. Sow winter fodder crops, such as rye, barley, and vetches. Prepare land for lucerne plots for autumn seeding. Make silage of maize and other crops for winter use.

Orchard.—Prepare new land for planting; plough deeply and subsoil; leave surface rough. Plant out strawberries after first rain. Plant crops for green manure. Continue to fight the Codlin Moth.

Vegetable Garden.—Prepare ground for winter crops. Plant out seedlings in moist soil. Sow cabbage, cauliflower, lettuce, early peas, swede turnip, beet, carrot, radish, and early onions.

Flower Garden.—Cultivate and water. Feed dahlias, chrysanthemums, and roses. Plant out shrubs, trees, and all kinds of bulbs. Sow hardy annuals. Plant geranium and pelargonium cuttings. Spray for Aphis, Red Spider, and Mildew.

Vineyard.—Select scions, if not done last month. In cooler districts, where ripening is difficult, it may be assisted by removing basal leaves only, as soon as berries change colour. This is the month for drying currants, sultanas, and gordos (Lexias and Clusters). Do not pick before grapes are properly ripe. For instructions for packing grapes for export, apply to Department. Shipments should be made in March and early April.

Cellars.—Vintage month. For light dry wines, pick as soon as grapes are ripe; do not wait for over-maturity, as is so often done. Pay attention to temperature control and acidity; correct latter, if deficient, with tartaric acid or late grapes. Acidimeter supplied by Department; price 10s. 6d. Sulphiting and the use of pure yeasts are strongly recommended, as they insure production of sound wine; further information supplied on application.

BEE-KEEPING.

Since the end of November the season has been quite abnormal from the bee-keepers' point of view. Owing to frequent cold changes and southerly winds but little surplus honey has been stored from Yellow Box and Redgum, even in favoured localities, so that the total yield will be far short of what was expected.

During February bees commence to arrange their stores of honey and pollen in preparation for the coming winter, and it is therefore unwise to interfere with the combs in the brood chamber, to insert empty combs between the brood, or to change the position of the combs.

Where there is a surplus of honey in the upper story, it is best not to take the whole of it in one operation, but to take half, and when the emptied combs are filling up again take what was left. At this time of year bees will work better and keep on breeding longer with a full, or partly filled, super than with empty combs above the cluster of bees.

When there is a shortage of honey in February or March, it is best to give only enough sugar syrup to carry the bees through till April, but to give whatever amount is necessary in the shortest possible time. Feeding extending over many days will stimulate brood-rearing, and a few weeks later the bees will be short of food again, compelling further feeding.

In the case of colonies below the normal strength in the number of bees, continuous light feeding will do no harm; it will, on the contrary, be beneficial, as it increases the number of young bees; but the feeding for winter stores should be deferred till the middle of April, when but little of it will be used for brood rearing.

GREEN FEED FOR WINTER

This is the most favorable season experienced for some years. SOW NOW! for the recent rains and warmth in the ground will give QUICK RETURNS

WINTER FODDER CROPS

Somner's Special Mixtures

No. 1—Rye, Dun Peas, Golden Tares (Vetches), Barley or White Oats, mixed quantity, sufficient for 1 acre - - - - - - **15/6**

(Five-acre lots, **14/6** per acre).

No. 2—Oats, Cape Barley, Golden Tares, Tick or Horse Beans, Partridge, Dun, or Blue Peas, mixed quantity, sufficient for 1 acre - - **18/6**

(Five-acre lots, **17/6** per acre).

Either of these mixtures, if cut or pastured in Winter and ploughed under in August, will make a good preparation for Lucerne to be sown in August or September.

The growing of Summer Fodder Grops imposes a tax on the resources of the soil, and as a restorative when ploughed in, the above mixtures are specially recommended. The crop comes away rapidly and makes steady headway during Winter, giving a good quantity of excellent fodder.

Somner's Giant Kangaroo

— RAPE —

(We are the original Introducers)

A highly nutritious and palatable green feed. **Will fatten 3 more sheep per acre than any other kind. Will not taint the milk.** Sow 4 to 6 lbs. per acre in drills, or 8 to 12 lbs. broadcast. 1/- lb.; 100/- cwt.

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Dutch Grown, 8d. lb.; 70/- cwt.

Egyptian or Berseem

CLOVER

The Great Winter Fodder

Valuable for its green or dried fodder, and as a Winter Soiling Crop for Orchards, Vineyards, &c., on irrigated land. At least four cuttings can be made during a season. Sow 8 to 12 lbs. per acre in drills, or 20 to 30 lbs. broadcast.

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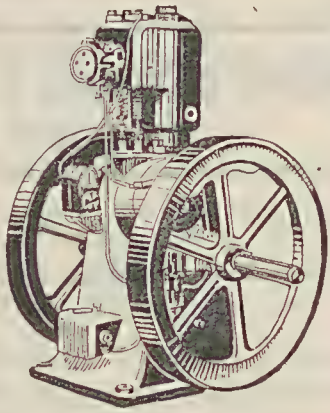

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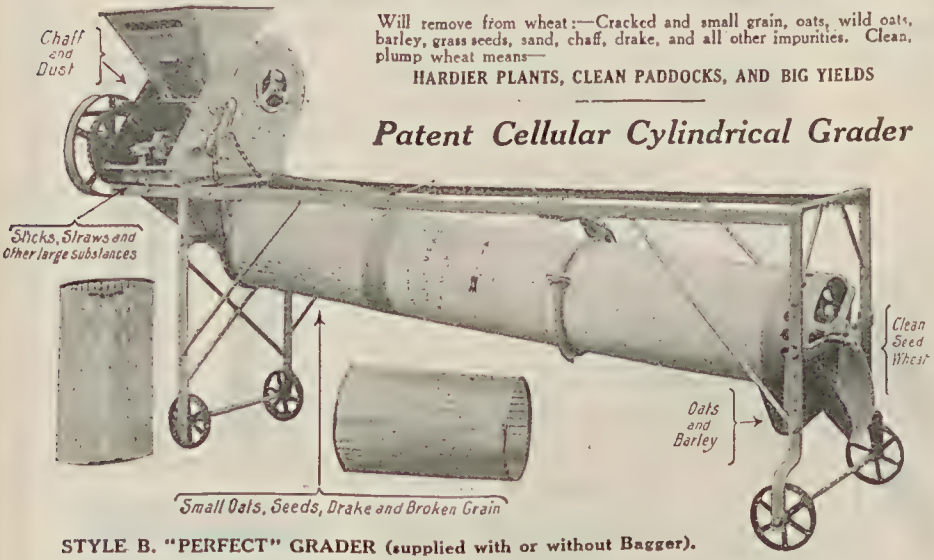
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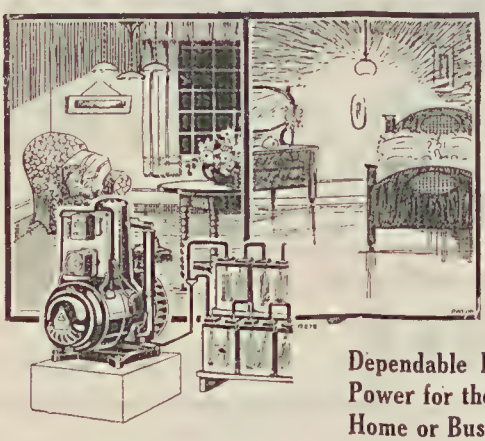

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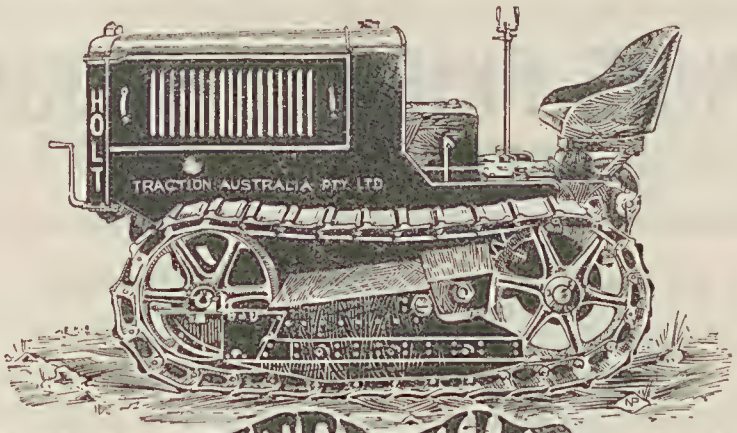

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PURE FRIESIAN HERD

Bull Calves for Sale

(1) Bull Calf *ex* Dominion Belle Corona

Dropped 24th January, 1923

(Registered No. of Dam 369 Friesian Herd Book of Australia, Vol. 2).

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (1206 N.Z F.H.B.) (73 F.H.B.A.).

Sire of Dam: **Oak de Kol 2nd Homestead Fobes** (imp. to N.Z. from America) (341 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—

11,646 lbs. Milk, 3·61 Test, 420 lbs. Butter Fat.

For Full Lactation Period—

11,715 lbs. Milk, 3·61 Test, 424 lbs. Butter Fat.

(2) Bull Calf *ex* Dominion Proud Lassie

Dropped 26th February, 1923

(Registered No. of Dam 368 Friesian Herd Book of Australia. Vol. 2).

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (as above).

Sire of Dam: **Woodcrest Jo** (imp. to N.Z. from America) (334 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—

11,336 lbs. Milk, 3·42 Test, 387 lbs. Butter Fat.

For Full Lactation Period—

12,216 lbs. Milk, 3·51 Test, 428 lbs. Butter Fat.

(3) Bull Calf *ex* Dominion Hyacinth

Dropped 29th August, 1923

(Registered No. of Dam 374 Friesian Herd Book of Australia, Vol. 2).

Sire: **Victoria Songboy (359)** by Dominion Domino Dutch Boy (as above).

Sire of Dam: **Oak de Kol 2nd Homestead Fobes** (imp. to N.Z. from America) (341 N.Z.F.H.B.).

Dam's Record for 273 days under Government Herd Test—

11,512 lbs. Milk, 4·08 Test, 479 lbs. Butter Fat.

For Full Lactation Period—

13,898 lbs. Milk, 4·24 Test, 589 lbs. Butter Fat.

The record of Victoria Songboy's dam DOMINION MADRIGAL for 273 days under Government Herd Test is 11,373 lbs. Milk, 3·93 Test, 448 lbs. Butter Fat; and for Full Lactation Period 13,485 lbs. Milk, 4·17 Test, and 563 lbs. Butter Fat. "Dominion Madrigal" is a full sister to "DOMINION QUEEN MERCEDES," third cow of all breeds under Government Herd Test 1923, and Winner "Weekly Times" Butter Competition, Melbourne Royal Show 1923, and Champion Melbourne Royal Show 1923.

INSPECTION of these Bull Calves at the Horticultural Gardens, Burnley, is invited.

APPLICATION FOR PURCHASE to Dr. S. S. Cameron, Director of Agriculture, Melbourne.

DEPARTMENT OF AGRICULTURE, VICTORIA

Red Poll Dairy Herd

The Department will shortly have completed the orders for calves that were booked ahead of calving when the advertisement was withdrawn; consequently the booking of orders for bull calves from the forthcoming calvings has now been resumed.

BULL CALVES are sold for delivery at a month old at prices based approximately on the actual milk and butter fat record of the dam at the rate of 1s. per lb. of butter *fat* yielded.

(For Record of Yields of dams see Red Poll Herd Book.)

The Bulls in Use include—

LONGFORD MAJOR (Imported)

Dam's Record	14713 lbs. milk	...	6 years average	11338 lbs. milk
G. Dam's	,, 10548	,,	...	4	,,	,,	9135 ,,

BELLIGERENT (Imported)

Dam's Record (1st milking) 7144 lbs. milk.

Dam's Dam's	,,	14533 lbs. milk	...	4 years average	12871 lbs. milk
Sire's Dam's	,,	10370	,,	...	7	,,	,,	9354 ,,
Sire's D. Dam's	,,	9510	,,	...	12	,,	,,	8033 ,,
G. Sire's D. Dam's	,,	10215	,,	...	7	,,	,,	9386 ,,
G.G. Sire's D. Dam's	,,	12565	,,	...	10	,,	,,	8853 ,,
G.G.G. Sire's D. Dam's	,,	10088	,,	...	2	,,	,,	9754 ,,

Inspection of the Herd is Invited.

Visitors will be met at the Station on notifying the Manager, State Research Farm, Werribee.

Application for purchase to

Dr. S. S. CAMERON, DIRECTOR OF AGRICULTURE, MELBOURNE.

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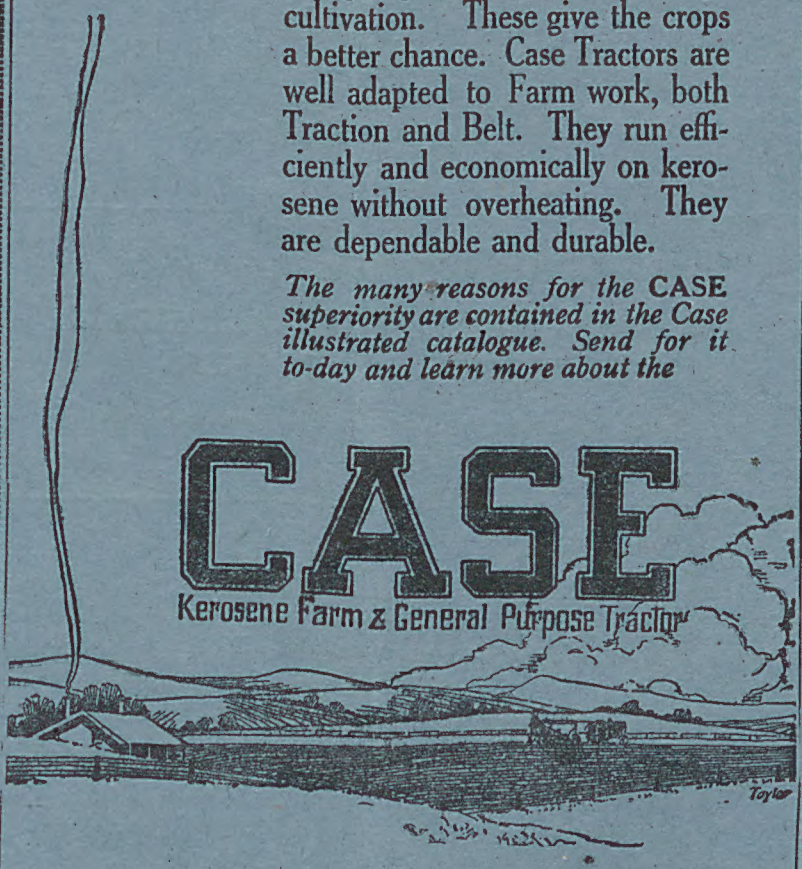

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